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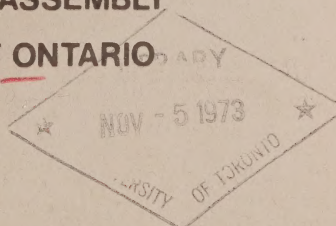
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FOREIGN OWNERSHIP : ARCHITECTURE AND ENGINEERING CONSULTING

Prepared as part of a study on
**FOREIGN OWNERSHIP :
CORPORATE BEHAVIOUR AND PUBLIC ATTITUDES**

for the
SELECT COMMITTEE ON ECONOMIC AND CULTURAL NATIONALISM
of the
LEGISLATIVE ASSEMBLY
PROVINCE OF ONTARIO



by
KATES, PEAT, MARWICK & CO.
October, 1973

PUBLISHED BY
THE SELECT COMMITTEE ON ECONOMIC
AND CULTURAL NATIONALISM
OF THE LEGISLATIVE ASSEMBLY OF ONTARIO

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The views expressed in this report are those of the
Kates, Peat, Marwick & Company Study Team, and are not necessarily
those of the Select Committee.

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October 16, 1973

Mr. Russell D. Rowe, MPP
Chairman
Select Committee on Economic
and Cultural Nationalism
Room 104
Parliament Building
Queen's Park
Toronto, Ontario

Dear Mr. Rowe:

This report, Foreign Ownership: Architecture and Engineering Consulting, is submitted to you as part of the overall study of Foreign Ownership: Corporate Behaviour and Public Attitudes which we are conducting on behalf of the Committee. Architecture and Engineering Consulting is the third of the six industries included in the study to be reported on in a separate volume.

We appreciate the review of earlier drafts by the members and staff of the Select Committee, and consider this input as most useful to the development of the study. At the same time, we wish to acknowledge the full co-operation of those firms researched in some depth, as well as the assistance from other individuals and firms who participated in the study.

In accordance with our terms of reference, this report provides factual and attitude information on the Architecture and Engineering Consulting industry and its people, relative to the various issues of foreign ownership and control. Policy recommendations are not made since the Committee will be drawing its own conclusions based on this and other information before it.

We have attempted to make the report as complete and objective as possible within the context of available time and resources, and we trust that it will assist the Committee in its deliberations.

Yours truly

KATES, PEAT, MARWICK & CO.

Kates, Peat, Marwick & Co.

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Covering Note



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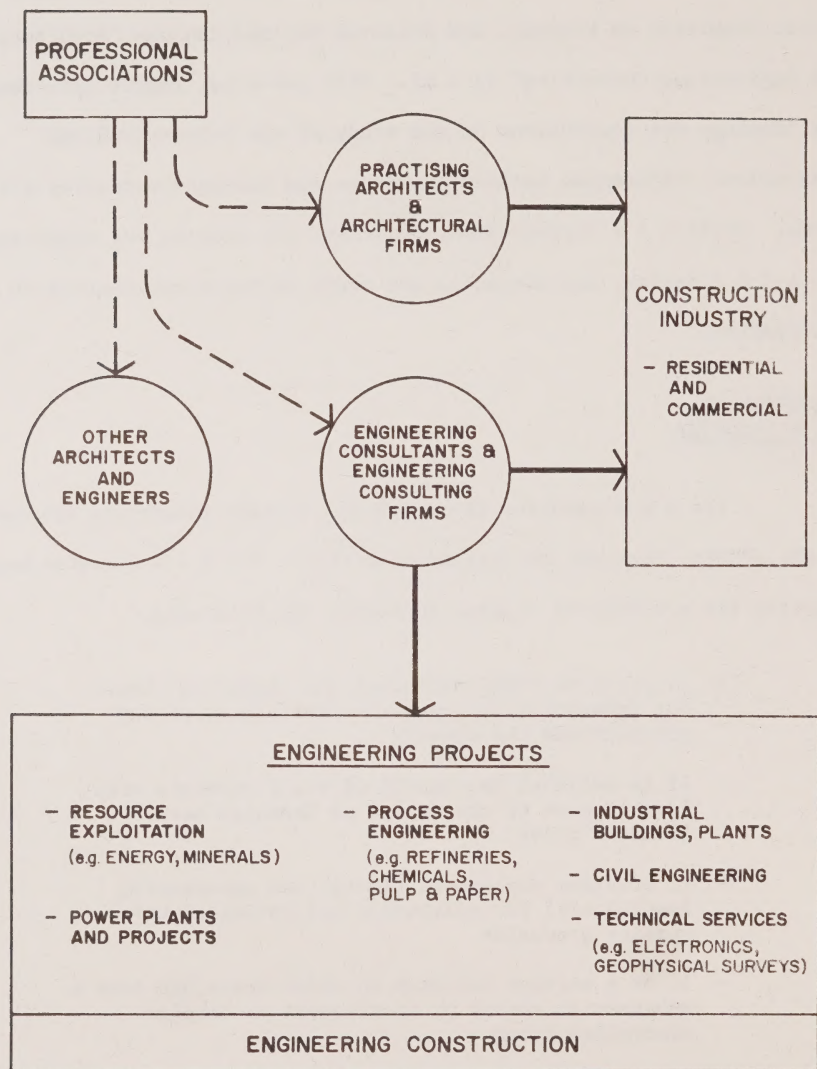
I - INTRODUCTION

One of the six industry studies commissioned by the Ontario Select Committee on Economic and Cultural Nationalism was "Architects and Engineering Consulting" (A & E). This sub-study report describes the findings and conclusions of the study of the behavioural and attitudinal differences between Canadian- and foreign-controlled A & E firms. Section I - Introduction, describes the reasons for selecting the A & E industry, and discusses the study approach and sources of information.

SELECTION OF A & E INDUSTRY

The A & E industry is one of two service industries studied by the KPM&Co. team for the Select Committee. The A & E industry was selected for a number of reasons including the following:

- it provides a key technical and managerial basis for industrial and resource development of the province and the country
- it is believed the export of A & E services will lead in part to the export of Canadian manufactured goods
- it provides employment (though not necessarily immediately) for scientific and technical university graduates
- it is a service industry in which there has been a substantial amount of involvement of foreign-controlled firms
- foreign architects, in particular, are believed to have significant cultural impact through their influence on the design of major downtown developments.

EXHIBIT 1A. & E. SERVICE AND PROFESSIONAL RELATIONSHIPS

Architects were combined with engineering consultants due to the similarity of the professional status of the two groups, and because both enjoy a large role in physical development projects. Some important characteristics which link the architects and engineering consultants are as follows:

- as professionals, architects and engineering consultants have legal authority and responsibility to regulate their membership through professional associations
- both are responsible for ensuring certain safety standards and codes to fully protect the public
- there are a large number of professional architectural and consulting engineering firms with technical skills of almost every discipline and specialty required for all types of physical development in Canada
- there are overlapping and continually evolving areas of expertise, in addition to the diversity and size of firms; thus, comparisons among firms are more difficult than for service sectors which are more homogeneous in terms of sizes and types of firms.

Basic relationships among the associations, architects, engineers, their firms, and their projects are portrayed in Exhibit 1, opposite.

At the same time, there are significant differences between the two professions, and consequently the analysis and presentation of findings in this report separate architects from engineering consultants where appropriate. A background description of the architectural and engineering consulting professions is provided in the next section of this report.

All six industry sub-studies followed a basic common format. The particular features of the A & E industry approach are outlined below.

STUDY APPROACH

Sample Firms

Similar to the process for the other five industry sectors, a selection of five Canadian- and foreign-controlled firms was made and these firms investigated in some detail. Due to the variety and breadth of the professional firms in the industry, senior officials of ten other firms were interviewed individually to provide a broader spectrum of views. The selection of the five, based on preliminary information available, was made through an assessment of the "fit" of individual companies with the following categories:

- two large foreign-controlled engineering consulting firms with substantial operations in Canada
- a large Canadian-controlled architectural firm
- two large Canadian-controlled engineering consulting firms, whose areas of expertise match in some aspects those of the large foreign-controlled firms.

The reason no comparable foreign-controlled architectural firm was selected for analysis is that, owing to provincial regulations, foreign-controlled architectural firms cannot be registered in the Province. Foreign architectural firms do operate in Canada on some projects, but have no offices established in Canada. How they work on Canadian projects is discussed in a later section.

Although a number of individual officials of medium-sized architectural and engineering consulting firms were interviewed, none was included in the sample of firms analyzed in depth. The reason for concentrating on large firms is that the important issues of foreign-controlled firms' operations in Canada centre around the larger projects. The foreign-controlled engineering consulting firms that compete for such projects in Canada are primarily extensions of very large international firms, with varying degrees of autonomy and size in Canada. Comparable Canadian-controlled firms were selected from those who were thought to be capable of bidding for such projects.

There appears to be considerable use made of foreign experts in Canada, among them architects and engineering consultants. Their work in Canada has important implications for domestic professionals, and is part of the overall "foreign ownership" situation in the industry. However, it was decided to concentrate on the larger corporate entities and comparative performances between Canadian- and foreign-controlled firms.

Approach to Sample Firms

The chief executive of each of the sample firms was interviewed and asked to co-operate in a detailed analysis of his firm's operations. A management questionnaire was produced and is attached as Appendix A to this sub-study report. The questionnaire was divided into two parts, the first part left with the firm to complete on the basis of operating data within the firm, and the second part used as

the basis for discussion with the senior officials of the firm. Following the initial interview with the chief executive officer, other officials of the firm were interviewed to acquire a detailed understanding of the firm's operations.

Professional Associations

In view of the importance of the professional associations governing the activities of engineers and architects, an attempt was made to work closely with the associations in the course of this A & E sub-study. The associations contacted were as follows:

- Association of Professional Engineers of Ontario (APEO)
- The Association of Consulting Engineers of Canada (ACEC)
- The Royal Architectural Institute of Canada (RAIC)
- The Ontario Association of Architects (OAA)
- The Engineering Institute of Canada (EIC).

Considerable assistance was obtained from the "Canadian Engineering for Canadian Engineers" Committee established by the APEO. The work of this APEO Committee coincided with the A & E industry sector sub-study, and discussions were held with the APEO officials throughout the course of the A & E sub-study and the APEO Committee's work. The KPM&Co. sub-study report has the benefit of drawing upon a completed report¹ by the APEO Committee.

1. "Report of the Committee on Canadian Engineering for Canadian Engineers", May, 1973.

The KPM&Co. sub-study benefited also from discussions with the other associations, and in particular, an ACEC submission² to the Federal Department of Industry, Trade and Commerce (1971). In general, however, data on such questions as amount of architectural work imported or exported, the business of foreign-controlled A & E firms in Canada, and other factual data were not obtainable through the associations.

Statistical Research

As additional background to the A & E sector, appropriate use was made of the Statistics Canada and Federal and Provincial Departments' information, primarily about engineering consultants. The other major sources of information available were a 1969 survey for the Department of Industry, Trade and Commerce, which identifies the payments to foreign firms for scientific research and consulting services,³ and a survey of exports of engineering consulting services by the same department.⁴

A & E Clients

Besides interviewing individual A & E firms, four purchasers of engineering consultants' and architects' services were interviewed. These interviews helped especially to determine (a) why they made their

-
2. "Submission to the Department of Industry, Trade and Commerce", Export of Engineering Services Committee, The Association of Consulting Engineers of Canada, August, 1971.
 3. Statistics Canada, 67-001, Third Quarter 1971.
 4. "Canadian Consulting Services Abroad", Department of Industry, Trade and Commerce, 1969.

particular purchase decisions, and (b) their reaction to possible government measures designed to influence their purchasing policies regarding engineering and architectural services.

Further Research
in Architecture

Since there was not the same possibility to compare Canadian- and foreign-controlled architectural firms as was the case for engineering consulting firms, the study of architectural firms was conducted somewhat differently as discussed in Section III. It was recognized that architectural firms practise almost exclusively in the construction field; an analysis was therefore made into other aspects of the construction business as part of the study of architectural firms.

In particular, the architect's relationships to the developer, the land owner, the financier and the supplier of building materials were examined. An attempt was made to identify the influence, if any, of foreign ownership in these related fields on the architectural profession.

II - INDUSTRY BACKGROUND

This section provides background on the A & E industry. It describes its size characteristics, the professional association of architects and engineers, the volume of imports and exports of architectural and engineering services, and the degree of foreign ownership in the A & E industry.

SIZE CHARACTERISTICS

The basic figures for the A & E industry groups are summarized below for Ontario. This Province represents about half the engineering consultants in Canada and possibly a similar proportion of architects.

	<u>Architecture</u>	<u>Engineering Consulting</u>
Individuals	1,300 (OAA members)	3,000 (APEO estimates)
Firms	500 (OAA members)	551 (APEO members)

Consulting engineering accounts for about ten per cent of the total number of professional engineers in Ontario, while the number of architects in Ontario who work for architectural firms is probably more than half the total number of OAA members. Therefore, this sub-study focuses on a relatively small part of the engineering profession and a relatively major part of the architectural profession.

The background to these summary figures is described in some detail below, since some of the figures are subject to considerable qualification.

EXHIBIT 2SIZE DISTRIBUTION OF CONSULTING ENGINEERING FIRMS
AND OTHERS ENGAGED IN ENGINEERING CONSULTING¹

Firms Employing	CONSULTING ENGINEERING FIRMS		OTHERS ³	
	Number Of Firms	Number of Professional Engineers ²	Number Of Firms	Number of Professional Engineers ⁴
1 - 5 Engineers	477	945	423	674
6 - 25 Engineers	62	580	32	288
26 - 50 Engineers	8	268	1	32
51 - 100 Engineers	4	222	0	0
101 - up Engineers	0	0	0	0
Total: ⁵	551	2,015	456	994

- NOTES:
1. The figures are consulting engineering firms and other firms holding "certificates of authorization" which authorize these firms to practice professional engineering in their own name under the provisions of Section 20 of the Professional Engineers Act (R.S.O. 1970).
 2. These figures are those shown on record as the number of engineers, which is estimated to be 10 to 25 per cent low as firms tend to omit temporary or junior employees.
 3. The "Others" category includes manufacturers who offer "professional engineering services" from time to time.
 4. These figures are those shown on record, which in most cases, show only supervisory engineers; the total number may be 100 per cent greater than the numbers shown.
 5. There are estimated to be as many as 500 sole practitioners in addition to those recorded above.

SOURCE: Letter from Mr. G. W. Thomson, P. Eng., Director, Member Services Branch, APEO, March 23, 1973.

Engineering Consultants

Professional engineers who are members of the Association of Professional Engineers of Ontario (APEO) number about 33,000. Most of these members work for large organizations in private industry and government. They are involved in product design and modification, process engineering, research and development, administration and sales, etc.

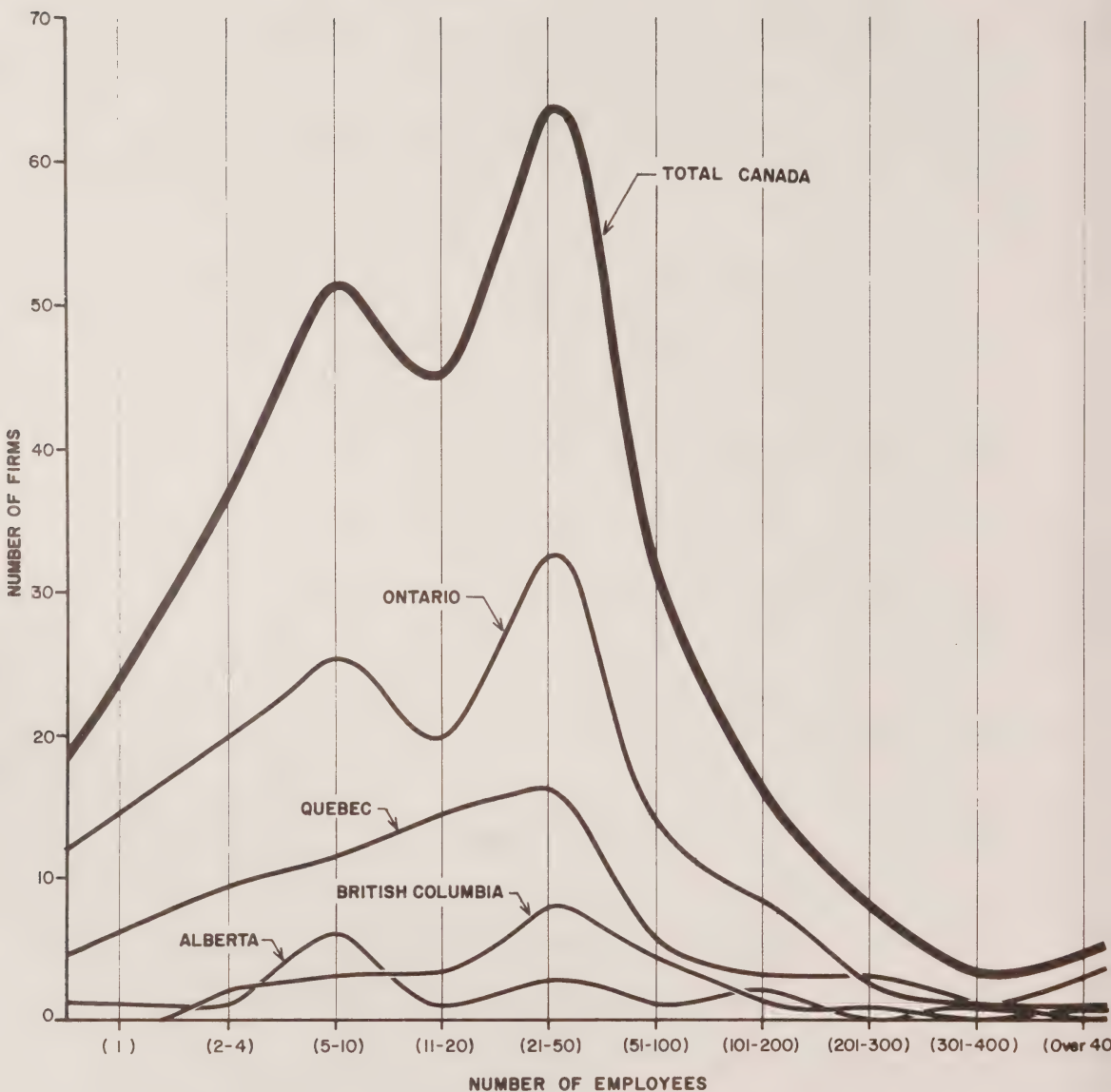
A significant number of the APEO members are consulting engineers, either individually or as owners or employees of consulting engineering firms. The number of engineers working for engineering consulting firms has been estimated by the APEO to be roughly 3,000 in Ontario and 7,000 in the whole of Canada. The basis for the APEO Ontario figures is shown in Exhibit 2, opposite. The figures are subject to a number of considerations as itemized below the table; these considerations account for the apparent discrepancy between the 3,000 figure mentioned above and the 2,015 figure in Exhibit 2, opposite.⁵

The Association of Consulting Engineers of Canada (ACEC) lists approximately 280 member firms across Canada, of which about half have offices in Ontario. This figure is much lower than the APEO one; ACEC has a charter, approved by Letters Patent in 1926, but has not the regulatory authority of the provincial associations. Thus, its membership is voluntary and the association tends to attract firms which are primarily engaged in engineering consulting.

5. When 25 per cent is added to 2,015 (the recorded number of engineers working for consulting engineering firms) and the estimated 500 sole practitioners are included the actual number is 3,018 engineers.

EXHIBIT 3

SIZE DISTRIBUTION OF ACEC MEMBER FIRMS FOR SELECTED PROVINCES



SOURCE: "ASSESSMENT REPORT TO FEB 8, 1973", ACEC

Geographic Spread

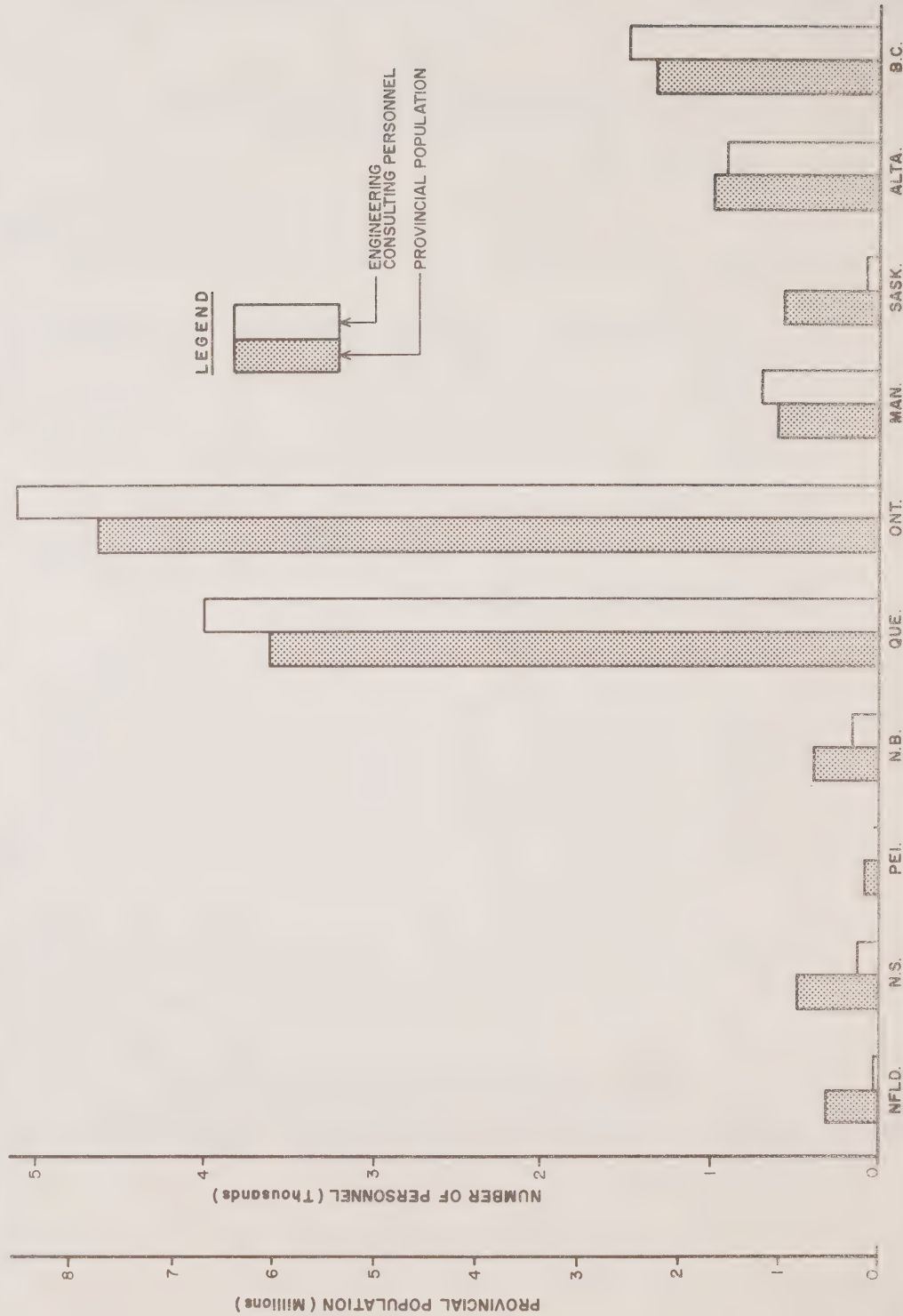
An attempt was made to identify the distribution of engineering consulting firms among provinces, in terms of size and total number.

Information on the member ACEC firms is presented on Exhibit 3, opposite, in the form of a size distribution graph of the Ontario firms compared with the total number of firms in Quebec, Alberta, B.C. and Canada. It is to be noted that the number within each firm is the number of employees, about one-third of which is professional. The Exhibit indicates that Ontario firms are not disproportionately larger than those of other major provinces.

The estimate of the personnel employed by the ACEC member firms was obtained from averaging the figures for the number of firms in each size category. These figures are shown for each province on a bar chart on Exhibit 4, overleaf, along with the relative population size of each province.

The bar chart indicates fewer consulting engineering personnel in the Maritimes and Saskatchewan relative to their provincial population. It also shows that while Quebec and Ontario are over-represented, this is not proportionately in excess of their population. If the smaller, non-ACEC member firms were included, the representation in the smaller provinces would probably be increased relative to that in the larger provinces.

DISTRIBUTION OF ENGINEERING CONSULTING EMPLOYEES AND POPULATION BY PROVINCE



SOURCE: "ASSESSMENT REPORT TO FEBRUARY 8, 1973", ACEC

There are a number of important firms which do not belong to ACEC, however, for apparently they do not qualify for membership. The most important firms are the large, foreign-controlled engineering-construction firms, which do not qualify due to their "conflicting" activities, i.e. construction. The two foreign-controlled firms in the sample of firms selected for in-depth study are in this category.

Architects

The number of architects who are members of the Ontario Association of Architects (OAA) is approximately 1,300. The number of firms (or "practices") which are members of the OAA is about 500.

Apart from the number of firms and number of member architects, the OAA has no other information with respect to its members. A questionnaire was sent early in 1973 to member "practices" requesting information relative to the size and type of projects. However, according to the OAA, the survey was not successful, and the decision was taken by the OAA not to release any results to the sub-study team. Senior architects interviewed estimate the average architectural firm as being relatively small - with only a very limited number of medium to large firms.

Besides the OAA members, it is estimated that perhaps several hundred other individuals with architectural degrees are working in Ontario. They are working either as technicians with architectural firms or with other types of firms including: developers, planning firms, engineering consulting firms, governmental organizations, manufacturing companies, and other types of consulting organizations.

Foreign-controlled architectural firms cannot become members of the OAA, and no architectural firm can practice in Ontario without being a member of the OAA. The foreign-controlled firms operate in Ontario as design consultants, and do this in association with OAA member architectural firms. Since foreign architects practice outside of the association, this sub-study goes beyond the provincial association membership.

PROFESSIONAL ASSOCIATIONS

Both architects and engineers are subject to provincial associations (APEO and OAA in Ontario) which have certain designated regulatory and licensing authorities over architects and engineers practicing in the province. All architectural and engineering projects in Ontario must be undertaken and signed by professional architects and engineers who are registered in the respective provincial associations.

Engineers who obtain certification in any province are normally accepted by the provincial association of any other. Architects, however, have stiffer certification requirements to meet in each province, usually including residency. Foreign engineers can acquire temporary certification for particular projects, while foreign architects are not permitted to do so.

A further distinction in the governing regulations between the two professions is that engineers can incorporate themselves, while architects cannot do so. This difference affects the degree of personal

financial liability faced by engineers and architects, although architects are able to protect themselves to a large extent through insurance.

It should be noted that the Act governing architects may be soon revised as proposed revisions are undergoing review within the Provincial Government. The revisions are purported to ease the regulations somewhat, although not substantially. It may become easier for foreign architects to practice in Ontario following a revision of the Act.

In the United States, engineers certified in one state can usually practice elsewhere in the U.S. Canadian engineers can usually obtain certification in one state, and thus obtain licences in other states as required. There is no comparable ease for Canadian architects to work on projects as architects in the United States. The U.K. and the U.S. have a reciprocity agreement, but this is not the case between Canada and the U.S. The reason for this, it appears, is that the provincial associations have not been able to agree on the type of arrangement most suitable.

IMPORTS AND EXPORTS

There is considerable concern among architectural and engineering consulting firms regarding the question of importation of services, and to some extent the export of services. Many Canadian engineering consultants are concerned that Canadian jobs are lost due to the amount of work on Canadian projects that is performed outside

Canada and "imported" into Canada. There is also some concern that Canadian engineering consultants are not sufficiently exporting their services for a variety of reasons.

Types of Imports

The APEO report described the various kinds of engineering services being imported; they were as follows:

- refinery design and construction (virtually all imported)
- tar sands developments (which appear to be destined to be designed by foreign engineers)
- minerals beneficiation engineering (although Canadian engineers get some of this work)
- industrial buildings (as indicated by customs evaluation)
- other unspecified special designs.

The refinery industry is a bête noire in terms of engineering work being done by foreign-controlled engineering consulting firms or by firms based outside the country. In an analysis of Canadian refinery construction between 1966 and 1971 obtained from the Ontario Ministry of Industry and Tourism, only about six per cent of the total amount of work was engineered in Canada. The total value of the projects was calculated at \$971 million of which \$51 million was engineered in Canada. Most of the work contracted to Canadian-controlled firms was for small projects with the average project size being about \$3.5 million and the largest one \$14 million. The refinery work undertaken by foreign-controlled engineering firms was for projects ranging in size up to \$190 million.

The oil industry developed in Canada much later than other resource-based industries, such as mining and pulp and paper, for example. In addition, the oil industry is a highly integrated one, largely controlled in the U.S., and major oil companies have apparently concluded that it would not be profitable to decentralize into Canada the technical design work involved in the construction of refineries. Therefore, it appears that much of the design and engineering work, particularly for large projects is conducted in the United States by both the oil company and the engineering contractor it hires.

No such detailed examination has been made of the petro-chemical and chemical and other process industries, but it appears that these are also areas in which a high proportion of engineering services are imported.

The APEO Committee also presented figures on imports of minerals beneficiation engineering. The table on the page overleaf shows the estimate of the annual engineering jobs lost for both minerals beneficiation and refineries as calculated by the APEO Committee.

Volume of Imports

In the Report of the Committee on "Canadian Engineering for Canadian Engineers", the APEO analyzed all available figures to attempt a quantification of the engineering services imported into Canada. The concluding estimate is that on an annual basis "some 10,000 professional engineering jobs" are represented by the value of such imports. It should be emphasized that the Committee was referring to engineers of

EXHIBIT 5

ENGINEERING JOBS REPRESENTED BY FOREIGN ENGINEERING
ON CANADIAN REFINERY AND MINERALS BENEFICIATION PROJECTS
(Assume 1 Professional Engineer to 3 Support Staff)

Type of Project	Professional Engineers Per Year Average	Support En- gineering Staff Per Year Average	Total Engineering Staff Per Year Average
Refineries	181	544	725
Minerals Beneficiation	107	323	430
Totals:	288	867	1,155

SOURCE: "Canadian Engineering for Canadian Engineers", Table VIII.

all types, of which there are about 66,000 licensed in Canada compared to an estimated 7,000 engineers engaged in engineering consulting.

In preparing its estimate, the APEO Committee cited three Federal sources, as follows:

- Corporations and Labour Unions Returns Act (CALURA): Report for 1969, Part 1 - Corporations
- The Canadian Balance of International Payments: 1965 to 1970
- Trade of Canada, Volume III - Imports, Calendar Years 1968 to 1970.

The APEO research attempted to extract the "engineering-oriented" figures from 1969 CALURA returns and 1970 Balance of Payments figures. The results were grossed in an attempt to include results from firms which were not incorporated in the CALURA or Balance Payments figures.

From the Balance of Payments figures an estimate of \$644.1 million was derived, as opposed to \$660.6 million of engineering-oriented imported services in the CALURA data. These results were translated into jobs at \$25,000 per job to equal 26,400 jobs, of which about 10,000 were regarded as professional engineering jobs based on an assumption of one engineering job per 2.5 employees.⁶

The APEO report also estimated the number of jobs represented by imported plans, drawings, blueprints, etc. in 1970. This estimate produced a result of only 207 professional engineering jobs. This low figure was rejected by the Committee since a subsequent evaluation of

6. The ratio of engineers to other employees could be high, although for the Committee's purpose the 10,000 figure is probably a reasonable "ballpark" figure; further in the Report (Table VIII) one engineering job per four employees is assumed.

the annual average number of professional engineers' jobs lost in refinery and minerals beneficiation projects alone resulted in a figure of 288, as indicated below.

The APEO Committee did not attempt to estimate how many engineering consulting jobs were lost. An examination of the refinery and minerals beneficiation types of projects was made which showed 288 professional engineers' jobs were lost. Most of these would be consulting engineering jobs, since refineries are built almost exclusively by foreign-controlled engineering firms and much of this work is performed outside of Canada. It is probably the most significant industry in which Canada imports engineering consulting skills.

ACEC officials estimate roughly that probably \$100 million worth of engineering consulting fees are imported at present. Translating this amount into engineering consulting jobs, using the APEO formula for converting dollar volumes of imports to engineering jobs, this represents about 1,500 engineering consulting jobs.⁷

The exact number of professionals in engineering consulting, or total number of employees not employed as a result of the importation of services, cannot be determined. It appears, however, that the number is significant, and that there is some substance to the argument that the importation of services dampens the demand for domestic engineering consulting services particularly in a few specialty areas.

7. The figure is arrived at by dividing \$100 million by \$25,000 (the per job estimate) and again by 2.54 (the ratio used by the AEPO Committee) to equal about 1,500 jobs for consulting engineers.

Exports

Engineering services are exported in two ways; first there is the straight export of engineering consulting services for the design of specific foreign projects. The major export fields in the past for Canada have been forestry, power, aerial surveys, mining, and transportation. Secondly, some manufacturers export highly technical equipment that requires extensive servicing either to install or maintain, and thus results in an export of engineering services. A CANDU reactor sale would be an example of this type.

In this sub-study the emphasis is on the first type described, that of engineering consulting.

Normal Statistics Canada data do not isolate architectural and engineering consulting services exports and no comprehensive figures are available. However, the Department of Industry, Trade and Commerce has surveyed engineering and consulting services firms for a number of years.

The most recent statistics are for the results of a survey sent to 485 firms in 1969, comprising architects, consulting engineers, management consultants, geophysical services firms, aerial survey firms and others. It was estimated that a majority of the firms was consulting engineers. Of the 140 firms that responded to the survey, 95 reported being engaged on foreign assignments during 1969. On the page overleaf is a table which summarizes the total export figures by province, by

EXHIBIT 6EXPORTS OF CANADIAN CONSULTING
AND ENGINEERING SERVICES, 1969

Province from Which Services Exported	Volume of Services Exported (\$ million)	Number of Firms
Ontario	20.1	42
Quebec	11.2	25
British Columbia	17.4	17
Prairies	1.0	8
Atlantic Provinces	0.1	3
Total:	49.8	95

Engineering Specialty	Exported to U.S.A. & Europe (Mostly U.S.A.)	Exported to Latin America, Carribean Asia, Africa	Total
	%	%	%
Forestry	74	10	34
Power	2	25	17
Aerial Surveys	2	21	13
Mining	6	15	12
Transportation	5	12	10
Industry	8	6	7
Hydraulics and Municipal	*	5	3
Buildings	2	3	2
Communications	1	3	2
Others	*	*	*
Total:	100%	100%	100%

* Less than 1%

SOURCE: Canadian Consulting Services Abroad, 1969 Survey, Department of
Industry, Trade and Commerce.

engineering specialty, and by destination location of the services.⁸ From these tables it would appear that in 1969 forestry dominated the export services and that Ontario exported more consulting and engineering services than any other province. (In the previous year the positions of Ontario and B.C. were reversed).

The 95 responding firms that exported \$49.8 million in consulting services generated \$154.2 million in domestic revenue. Exhibit 7, on the page overleaf shows the percentage distribution of export and domestic consulting services by province. These figures are interesting in terms of the regional strengths in each of the engineering specialties, although the responding firms are only those which also actively exported services.

The survey also determined the value of services exported to each region and the manner in which services were paid for. Exhibit 8, on page 29, gives percentage breakdowns for (a) the recipient region of the \$49.8 million, and (b) the source of payment or financing by region.

The figures illustrate that the "Third World" countries were the major recipients of consulting engineering exports from Canada, and this would appear to be the situation today. It also appears that in 1969 Canadian International Development Agency (CIDA) financing was

8. Of 485 firms receiving the questionnaire, only 140 firms responded. However, it is presumed that most of the export oriented firms would have responded and the figures probably accurately reflect the relative distribution of the types of services and their destination as of three and a half years ago.

EXHIBIT 7

PERCENTAGE DISTRIBUTION OF DOMESTIC
AND FOREIGN SERVICES OF 95 RESPONDING FIRMS, 1969

	ONTARIO		QUEBEC		BRITISH COLUMBIA	
	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic
	%	%	%	%	%	%
Forestry	3	*	7	6	88	41
Power	18	8	41	23	2	37
Aerial Surveys	35	19	1	*	-	*
Mining	17	15	18	20	*	4
Transportation	11	14	15	6	1	4
Industry	6	12	13	27	1	7
Hydraulics & Municipal	6	7	*	2	3	1
Buildings	3	10	1	6	*	4
Communications	*	1	4	4	4	1
Others	*	13	*	5	-	1
Total:	100%	100%	100%	100%	100%	100%

Note: * Less than 1%

Total Foreign Services: \$ 49.8 million

Total Domestic Services: \$154.2 million

SOURCE: Canadian Consulting Services Abroad, 1969 Survey.

Kates, Peat, Marwick & Co.

significant relative to international agencies. The other Canadian government agency involved has been the Export Development Corporation (EDC), whose financing of engineering consulting services has primarily been an extension of this agency's focus on financing the purchase of Canadian equipment.

ACEC officials estimate that about \$60 million is the current annual value of exports of engineering consulting services. Figures from the survey are available only for the years 1964 to 1969, as follows:

<u>Year</u>	<u>\$ Million</u>	<u>% Increase Over Previous Year</u>
1964	16.5	-
1965	25.0	51
1966	34.3	37
1967	37.9	10
1968	51.9	36
1969	49.8	-4

If the estimated volume of about \$60 million in 1972 is relatively accurate, the increase in the last three to four years has been relatively small.

Imports and Exports of Architectural Services

No figures were available for the value of architectural services exported from Canada. Major architectural firms are included among the firms surveyed by the Department of Industry, Trade and Commerce. On the basis of interviews with representatives of major architectural firms, it appears that today there are about four or five firms in Ontario which are exporting architectural services; in terms of fees

EXHIBIT 8DISTRIBUTION BY RECIPIENT REGION AND SOURCE
OF FINANCING OF EXPORTED CONSULTING SERVICES

Recipient Region	Volume of Exports (\$ Million)	Percentage Distribution
United States & Europe	18.4	37%
Latin America and Caribbean	13.9	28
Asia	11.0	22
Africa	<u>6.5</u>	<u>13</u>
Total:	\$49.8	100%

Funding Source	U.S. & Europe	Latin America Caribbean, Asia, Africa	Total
	%	%	%
CIDA	-	35	22
EDC	1	4	3
Private Canadian International Lending Agencies	3	5	4
Other External Sources (Third country)	1	15	10
Domestic	2	13	9
	93	28	52
Total:	100%	100%	100%

SOURCE: Canadian Consulting Services Abroad, 1969 Survey.

this probably represents only a few million dollars per year.

Information regarding the value of architectural services which are imported is not available either. The large projects presented in Exhibit 12, page 41 in Section III, which provide by no means a complete picture, are roughly equal to \$2.5 million worth of architectural services imported annually in the last 15 years. The total figure would be at least \$2 to \$3 million, then, and probably a good deal more if all projects in which foreign architects participated were included.

Conclusions -
Imports and Exports

It has been estimated very roughly that Canada imports about twice as much as we export in engineering consulting services. To emphasize this picture, the special business survey of 1969 (from the Canadian Balance of International Payments) is presented on Exhibit 9, overleaf. This exhibit attempts to extract the engineering related imports and exports. The figures demonstrate the uneven balance of imports vs. exports. They show in particular a large negative trade balance with the U.S. in these areas (\$116.8 million) and a small positive trade balance with all other countries (\$8.4 million).

Engineering services are related to a country's technological capability and its ability to innovate. Technological capability and innovation are believed to be critical competitive factors in secondary manufacturing and hence to a country's growth and development in this

EXHIBIT 9

SERVICE EXPORTS AND IMPORTS
RELATED TO ENGINEERING

PARTIAL SERVICE EXPORTS (1969) (\$ Millions)					
	All Countries	U.S.	U.K.	Other OECD (Europe)	All Other Countries
Consulting and Other Professional Services	29.1	13.3	4.5	1.6	9.7
Scientific Research and Product Development	18.2	13.7	0.6	1.2	2.7
Total	47.3	27.0	5.1	2.8	12.4

PARTIAL SERVICE IMPORTS (\$ Millions)					
Consulting and Other Professional Services	98.0	92.2	0.6	3.0	2.2
Scientific Research and Product Development	57.7	51.6	2.5	3.4	0.2
Total	155.7	143.8	3.1	6.4	2.4

sector. From the examination of the available import/export data we do not fare very well in this important area.

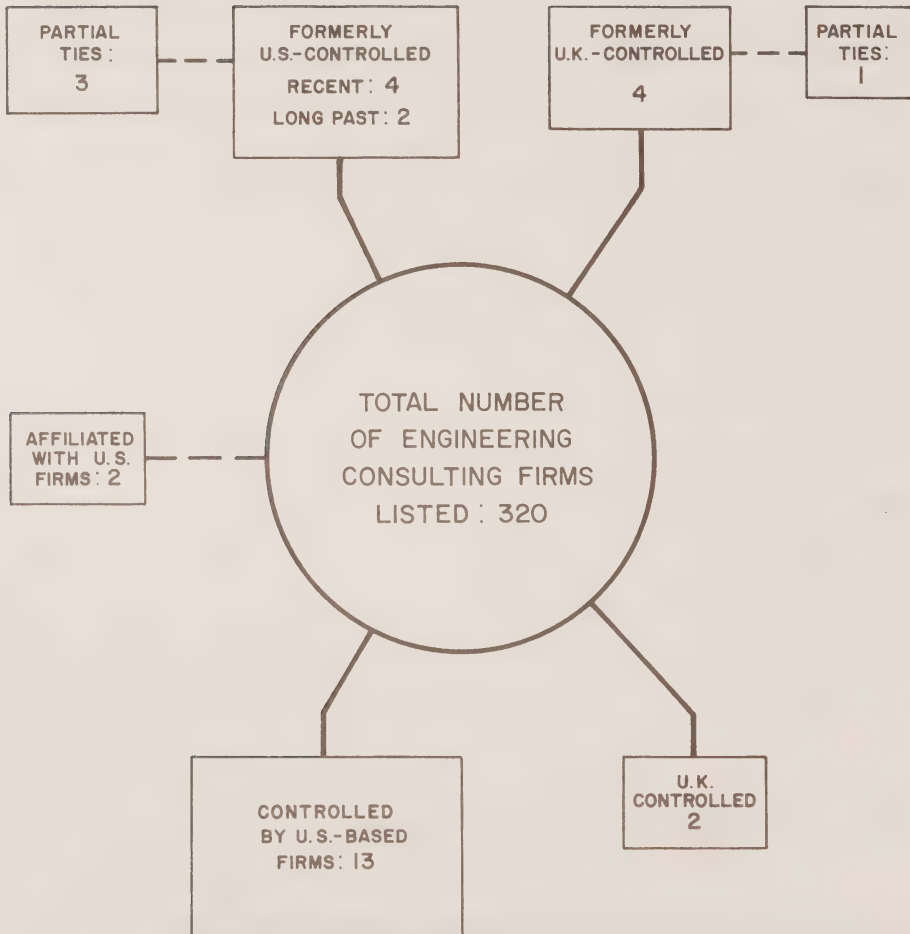
FOREIGN CONTROL OF ENGINEERING CONSULTING FIRMS

A great deal of information was obtained from two foreign-controlled firms, and is discussed in a subsequent section comparing them to Canadian-controlled firms. On the basis of interviews with firms and engineering association officials, an examination of some Toronto-based engineering consulting firms, and the APEO Committee's research, more information was obtained about the characteristics of a wider range of foreign-controlled firms and is discussed below.

Toronto Area Engineering Consultants

The number of foreign-controlled consulting engineering firms operating in Canada is not recorded. Engineering association officials estimate that there might be only about 25 in all of Canada. With the purpose of better understanding the characteristics of foreign-controlled engineering consulting firms, an analysis was conducted of the Toronto area firms.

With the assistance of a construction industry relations consultant (Michael Dennis & Associates Limited) each of the firms listing themselves as engineering consultants during 1972 in Toronto and Vicinity was identified as to present and past control. This analysis was conducted on an inspection basis, with reference to published information where

TORONTO - BASED ENGINEERING CONSULTING FIRMS

SOURCE : TORONTO AND VICINITY YELLOW PAGES, APRIL 1973
AND MICHAEL DENNIS & ASSOCIATES LTD.

available. Since the results were not checked with each individual firm they should be viewed as providing a general impression of the local engineering consulting firms rather than absolutely accurate numbers.

The results are presented graphically on the page opposite and described below.

Of the engineering firms listed in the Toronto Directory, 15 were identified as foreign-controlled. No systematic attempt was made to provide details on the size of the firms identified, and thus their importance relative to the great majority of Canadian-controlled firms. However, it can be stated that most of the 15 are medium- to large-scale in total, although the size of their Canadian operations varies substantially and is dependent on how successful they are in obtaining business in Canada. It can also be assumed that these 15 firms have a larger proportion of the Canadian engineering consulting business than their proportion to the total number of firms listed in the Directory.

Thirteen of the 15 firms identified as foreign-controlled are in the United States, while the remaining two are U.K.-controlled. Two other firms appear to be affiliated in some formal manner with U.S.-controlled firms, but not controlled by them.

Two of the 15 foreign-controlled firms appear to have been taken over by foreign-controlled firms. The others have established themselves in Toronto without having first acquired another firm.

What is also significant is the number that have switched from being foreign-controlled to Canadian-controlled. A total of ten firms seem to be in this category. Four firms were formerly U.K.-controlled and six formerly U.S.-controlled (including two whose ownership changed hands more than 50 years ago). The route to Canadian control in all cases appears to be one of the Canadian principals gradually buying out the foreign interests. There appears to be no set formula for doing this, and each case represents a separate history of corporate moves and changes.

Three of the four more recent switches from U.S. to Canadian control status are still partially tied to the former parent firm. Only one of the U.K. firms still retains ties to the former U.K. parent (a minority shareholder position), but it appears that the other three also went through periods of partial control by the former parent.

It is uncertain what kind of control over the subsidiary firms in Canada the U.K. parents had. It appears that the restriction on the three firms still associated with their former U.S. parents is that they cannot seek work on an independent basis in the United States. The exact nature of the arrangements in each case is not known.

"Canadian Beachhead"

It appears that foreign-controlled firms have come to Canada on the basis of obtaining or attempting to obtain large projects. It appears that only a minority of firms have established a continuing presence in Canada; most of the others revert to a sales office status at times when they have no large contracts.

For illustration purposes, it could be stated that a foreign firm operates in Canada in one of three basic ways:

- on a project basis, i.e. establishing a project office only as necessary for work on specific projects where the bulk of work may or may not be done in Canada
- as a sales organization, i.e. having a permanent office in Canada which acts as a sales office primarily, with project offices established as appropriate, where the bulk of the work may or may not be done in Canada
- as an operational entity, i.e. with a permanent engineering staff undertaking business development activities for its own office, and where most of the work would be undertaken in Canada.

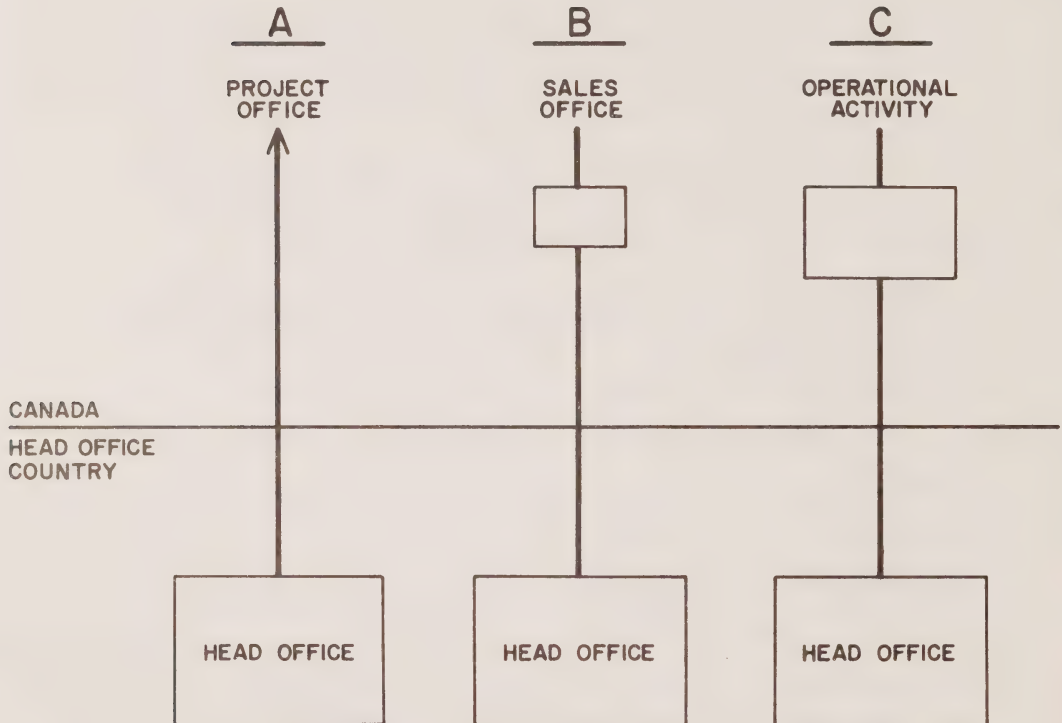
These alternative models are portrayed in Exhibit 11, overleaf, as A, B, and C respectively.

Historically, there have been a number of foreign-controlled firms which have attempted to establish a base in Canada and have failed. Whether there has been a trend for increasing or decreasing proportions of engineering work in Canada undertaken by foreign-controlled firms is difficult to determine. If the Toronto firms are typical of foreign-controlled firms in Canada, there seems to be an historical tendency for the principals eventually to buy themselves out of foreign ownership.

The overall behaviour of foreign-controlled firms operating from Canadian bases or directly from their home base appears to vary considerably. Sometimes firms appear to try to maintain much of the work in Canada, while in other cases they ship it back to the head office.

EXHIBIT 11

**ALTERNATIVE ORGANIZATIONAL MODELS
FOR FOREIGN ENGINEERING CONSULTING FIRMS
OPERATING IN CANADA**



Foreign-controlled engineering consulting firms sometimes find it easier and more profitable to undertake the work within the confines of their own organization in the head office.

The APEO Committee attributes much of the problem to imported engineering, rather than to the activities of foreign-controlled engineering firms in Canada. Engineering work carried out in Canada by foreign-controlled consulting firms represents engineering jobs in Canada and this is not the case for engineering work which is imported.

The question remains whether it is reasonable to argue that foreign firms should duplicate their services in Canada. Their perspective is an international one and their scale of operations very large with manpower allocated on a worldwide basis according to the requirements of major projects. To some extent, the response lies in whether these foreign firms can put all Canadian-oriented services in Canada, and thus achieve centres of excellence from which other projects around the world can draw upon. In Section IV, the behavioural characteristics of a selected number of firms are examined in detail, and these and other questions are raised in the context of the analysis.

III - FOREIGN OWNERSHIP AND CANADIAN ARCHITECTURE

As explained in previous sections, the overall study methodology of a behavioural comparison between foreign- and Canadian-controlled firms could not be followed in the case of architecture because there are no foreign-controlled architectural firms established in Ontario. One architectural firm was selected for examination in detail as part of a set of architectural and engineering consulting firms for comparison in Section IV.

This separate section on architecture has been prepared in order to focus on aspects of foreign ownership that have implications for architects and architecture in the Province. This section describes the influence of foreign architectural firms that do work on projects in Canada (as design consultants), the influence of "para architectural" firms (which may be foreign-controlled) that compete with Canadian-controlled architectural firms, and the influence of foreign-controlled firms that make up part of the construction industry as a whole (users of architectural services, building supplies and others).

FOREIGN ARCHITECTS IN CANADA

There are a number of major projects in Ontario and in Canada which have been largely designed by foreign architectural firms. From discussions with several architects, however, it appears that during the past several years the number of projects using foreign architects

has probably been decreasing (though no factual material was available to substantiate this conclusion).

Canadian architects maintain that they have now gained sufficient experience to obtain the confidence of principal clients. They also maintain that Canadian expertise in building techniques is quite strong compared to that of the United States, and that this is demonstrated by the keen interest of American architects in Canadian techniques.

In spite of the "bullish" attitude of Canadian architects there are still a few sore spots with respect to the experience of the last few years. While the number of projects in Canada designed by foreign architects is small, it is still particularly galling to Canadian architects. When foreign architects are involved, it is usually on projects that are particularly challenging. They are the "plum" projects, and the kind architectural firms like to do. They are also considered "leading edge" projects, where new design and building techniques are developed, and are thus important to a firm's ability to obtain future work.

The primary reason advanced for hiring foreign architects is that they have "proven" competence in certain building techniques compared to lack of same among Canadian firms. Managers of Canadian companies prefer to avoid the risk of hiring a firm with no proven competence. There appears to be in certain design areas a serious gap between the Canadian architect's confidence in his capabilities and the Canadian client firm's feeling that Canadian architectural firms lack the required capabilities, particularly for large buildings.

INVOLVEMENT OF FOREIGN ARCHITECTS IN THE
DESIGN OF SELECTED MAJOR PROJECTS IN DOWNTOWN CANADA

PROJECT	ESTIMATED VALUE	FOREIGN ARCHITECTURAL CONSULTANTS RESPONSIBLE	CANADIAN ARCHITECTS
Toronto Dominion Centre (Toronto)	In excess of \$100 m. completed 1967-1969	Mies van der Rohe (U.S.)	John B. Parkin Associates and Bregman & Hamann
Commerce Court (Toronto)	In excess of \$100 million Completed 1972	I.M. Pei (U.S.)	Page & Steele
Place Ville Marie (Montreal)		I.M. Pei (U.S.)	Affleck, Desbarats, Dimakopoulos, Lebensold & Sise
CIL House (Montreal)		Skidmore, Owings & Merrill (U.S.)	Greenspoon Friedlander & Dunn
Richardson Centre (Winnipeg)		Skidmore, Owings & Merrill (U.S.)	Smith Carter Searle
Pacific Place (Vancouver)		Gruen Associates (U.S.)	McCarter, Nairne & Partners
Place Belle Canada (Ottawa)	\$17.5 million	Edward Durrel Stone (U.S.)	Bregman & Hamann
Place Victoria (Montreal)		Pier Luigi Nervi & Morretti (Italian)	Greenspoon, Friendlander & Dunn
<u>PROPOSED DOWNTOWN PROJECTS</u>			
Eaton Centre (Toronto)	Estimated start 1975 Completion 1985. In excess of \$200 mil.	Gruen & Associates (U.S.)	Craig, Zeidler & Strong, Bregman & Hamann
Bank of Montreal (Toronto)	In excess of \$200 m. Completion 1976	Edward D. Stone (U.S.)	Bregman & Hamann

Continental Influence

One senior architect takes the position that American architects have played too strong a rôle in shaping the downtown areas of Canadian cities. The actual number of projects appears to be only a handful in terms of all projects in major Canadian cities; however, the projects have been major ones and have had a significant influence in creating downtown landmarks.

This tendency was described as a "continental" outlook on the part of the major backers of large office and commercial buildings. As an indicator of this continental influence, a list was compiled (see page 41) of major projects undertaken in Canada in the last several years that have been designed largely by American architects. This list is not complete, but provides an overview of the major projects.

The estimated value of these projects could be roughly \$1 billion in total, although a more precise estimate is difficult since figures were not available for many of the projects shown. If the total cost of these projects were \$1 billion, if they were completed over a 15-year period, and if foreign architectural services' fees were about four per cent of the total project costs, then about \$2.5 million was spent annually on importing architectural services. Such a figure is one order of magnitude in monetary terms of the continental influence of architecture in Canada; however, it only refers to the downtown projects listed, and does not include other forms of architectural services that may be imported.

The point about these projects, according to a subsequent letter to Kates, Peat, Marwick & Co. from the above-mentioned architect, is that the

"dominant and visually influencing form of our inner cities was based on conceptual ideas established in either New York or Chicago". This architect was quick to state that he was not attacking internationalism in architectural design (such as the case with the Toronto City Hall), but rather the continentalism of the designs. Therefore, according to this interpretation, the influence of foreign architects in Canada has been to shape our downtown commercial and retail areas according to the American mould.

Though it is difficult to evaluate the merits of this point of view, it does point out a tendency of major Canadian-controlled companies to go south of the border for prestige work rather than using Canadian architects. The chartered banks in particular have followed this practice.

When questioned whether Canadian architects are competent to undertake such large projects, architects replied as follows:

1. Canadian architects are now being used for major projects (e.g. the proposed new Royal Bank Building and Metro Centre in Toronto).
2. It appears that Canadian architectural firms which were associated with the foreign firms, when these foreign firms were engaged to do the design work of major projects, undertook most of the detailed design and engineering of these projects.

To help explain why major clients tend to act this way, architects emphasized that hiring an architectural firm is a chief executive officer or board decision. Architects of great stature, most of whom are foreign-based, are reported to be able to exercise what is called

"client control" over the decision-maker. "Client control" was a term used by some architects to describe particularly renowned architects who personally have a commanding presence and reputation (usually international) that inspires awe and respect from clients and their acquiescence to his recommendations and designs.

Perhaps the involvement of foreign architects in the past can in part be attributed to this "client control" phenomenon. It is more likely a combination of conservatism in wanting a proven architect and prestige in hiring a big name American architect or architectural firm.

Although the situation might seem to be improving with respect to the use of fewer foreign architects in Canada, it cannot be predicted that the next series of major projects will not also be foreign-designed. Canadian architects may be confident, but the question is whether Canadian clients will return to their historical tendency to hire the foreign firm.

Negative Impact on Acquiring Foreign Commissions

Accounts were given by at least two senior architects, of Canadian architectural firms having to explain to potential foreign clients why foreign architects were used in Canada. The argument runs that if Canadian architects are so good, why have so many major projects in Canada been designed by foreign architectural firms.

The Royal Architectural Institute of Canada (RAIC), in "An Open Letter to the Federal Party Leaders of Canada,"⁹ underlined this

9. Page 11 of a submission to party leaders prior to the 1972 federal election, entitled as noted above.

point with particular reference to the importation of foreign talent to design the Olympic Stadium 1976. The RAIC first objected to the hiring of foreign talent before even attempting to assess the capabilities of Canadians and, secondly, felt that it defeated the efforts of federal agencies to export Canadian technology.

PROTECTION
FOR ARCHITECTS

Architectural firms are quite strongly protected by provincial architectural associations, which prevent the establishment of foreign-controlled architectural firms. However, as the above-listed projects indicate, foreign architects have essentially bypassed this protection by acting as "design consultants" on Canadian projects. In addition, the "para architectural" firms also bypass association responsibility, and some of these organizations are foreign-controlled.

Some principals of larger architectural firms stated that they would prefer the OAA to loosen regulations, rather than restrict foreign architects from practicing in the Province. Apparently in the proposed revision to enabling legislation, the qualification of "citizens" has been changed to "residents" in membership requirements for individual architects.¹⁰ However, this feature may reflect the European backgrounds

10. Since the proposed new Bill has not been given official status, the exact wording of the revision has not been finalized. However, it is understood that a change will be made to the present citizenship requirements to permit the qualification of residents.

of many leading architects in practice today, or a desire by the Ontario Government to avoid discrimination against landed immigrants, rather than a desire to open the door to further foreign-based competition.

Provincialism

Senior architects tended to be very concerned about the provincialism of architectural associations in Canada. Provincial certification restrictions (which generally require residency) severely handicap their efforts to undertake the design of projects in other provinces. Architects apparently must fight each case individually, and associate themselves with a local architect. One architect stated that it was easier to work in the U.S. than elsewhere in Canada.

The provincialism problem even carries over to affect the free flow of architectural services on an international basis. Although the AIA (U.S.) and the RIBA (U.K.) - both national architectural associations - have a reciprocal agreement, the RAIC (Canada) does not have such an agreement with the AIA. As noted in a previous section, this lack of agreement appears to be the result of a failure of provincial associations to agree among themselves. The effect is to increase the difficulties for Canadian architects to undertake projects in the United States. Some of them are actively pursuing U.S. projects, but must operate on temporary permits.

THE COMPETITIVENESS OF THE ARCHITECTURAL FIRM

The question was raised as to whether the architectural firm

was being left behind in some respects in view of the encroachments on its traditional rôle by other organizations. If this were the case, it is conceivable that the architectural associations would have less control over the amount of foreign involvement in architecture.

In Exhibit 13, on page 48, is a list of the architectural services and sequence of activities as indicated in the OAA Schedule of Charges. For each service the Exhibit lists other types of organizations against which the architectural firm could now be competing.

When asked whether their profession was decreasing in importance, architects and association representatives replied that architectural firms were generally in a healthy competitive state. Principals of the larger firms asked rhetorically what services others could provide that they could not, implying by this answer that their firms were well equipped to undertake complex projects.

One leading architect admitted that architecture suffers competitive influences from parallel professions, and that architects may now be in competition with engineers, developers and project managers. On the other hand, an association official maintained that there used to be a fear that project management firms and developers were about to take over some of the traditional architectural functions, but that now these fears seem to have been unfounded. Association officials may not be the best people to provide realistic answers to this question, and further research was felt to be in order.

EXHIBIT 13

NORMAL ARCHITECTURAL SERVICES CAN BE PROVIDED
BY NON-ARCHITECTURAL FIRMS FOR SOME PROJECTS

NORMAL ARCHITECTURAL SERVICES ¹	OTHER FIRMS CAPABLE OF PROVIDING THE SERVICES
<ul style="list-style-type: none"> ● Functional planning and architectural program ● Pre-design. A ● Schematic design² 	<ul style="list-style-type: none"> ● Planning and management consulting firms specializing in space planning and site planning ● Development firms
<ul style="list-style-type: none"> A ● <u>Design development and sketch drawings</u>³ A ● <u>Contract documents:</u> <ul style="list-style-type: none"> - <u>working drawings</u> - <u>specifications</u> A ● Conferences 	<ul style="list-style-type: none"> ● Engineering or development firms
<ul style="list-style-type: none"> A ● Tendering ● <u>Construction and contract administration</u> ● Payment to the contractor ● Checking shop drawings ● Field inspection ● Site representation (site architects, engineers) ● Post occupancy service ● Operating manual ● As-built drawings 	<ul style="list-style-type: none"> ● Project Management firm and/or contract management firm, or engineering firm

- NOTES:
1. As abstracted from "Conditions of Engagement and Schedule of Minimum Professional Charges" (Ontario Association of Architects).
 2. Services where architects appear to be most suited from their training and conventional experience are indicated by "A".
 3. Normal services which consume greatest phase of standard architect's fee are indicated by underlining.

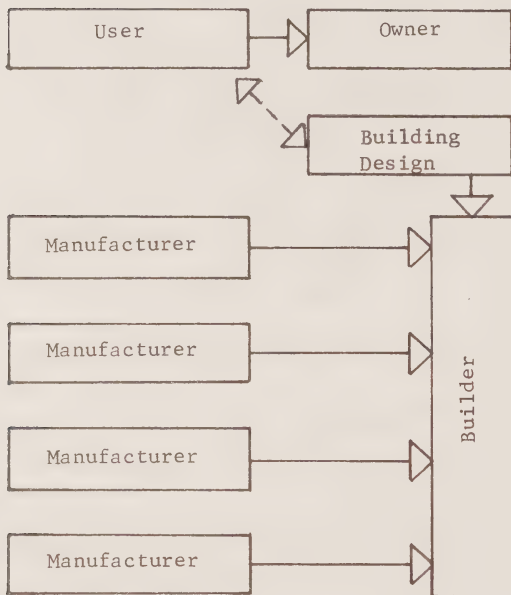
A recent development has been an allegation by an engineering consulting firm that the proposed revision of the Architects' Act is designed to provide architects with too much design and supervisory control over projects.¹¹ Whether the charge is valid or not, the controversy does indicate that architects may have been attempting to shore up their competitive position in revising their regulatory Act.

In order to expand on the relative position of architects more clearly, Exhibit 14, on pages 50 and 51, shows three ways in which large projects can be organized. The first one, the direct tender, is the most traditional approach and places the architect in the master builder position. The other two are more recent concepts and have tended to introduce a third party into the traditional client/architect relationship.

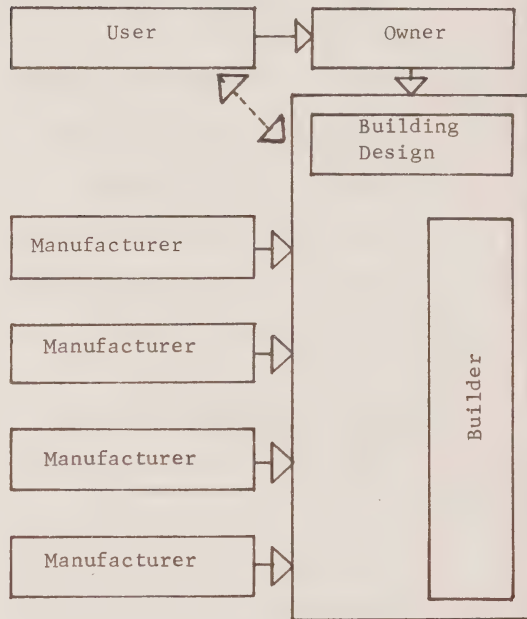
The introduction of the "third party" appears to be a trend, and is not popular among senior architects interviewed. Architects feel that they can deliver the sophisticated management services required of complex projects, and at the same time maintain a relationship with the future user or owner of the facility. They feel there is no need for a project manager, or for the developer to intervene between the user/owner and the architect.

A recent innovation in the design process for new facilities is the bringing in of the construction manager at an earlier stage. It appears that there may be some relationship between the insertion of the third party and the more recent recognition of the trade-off

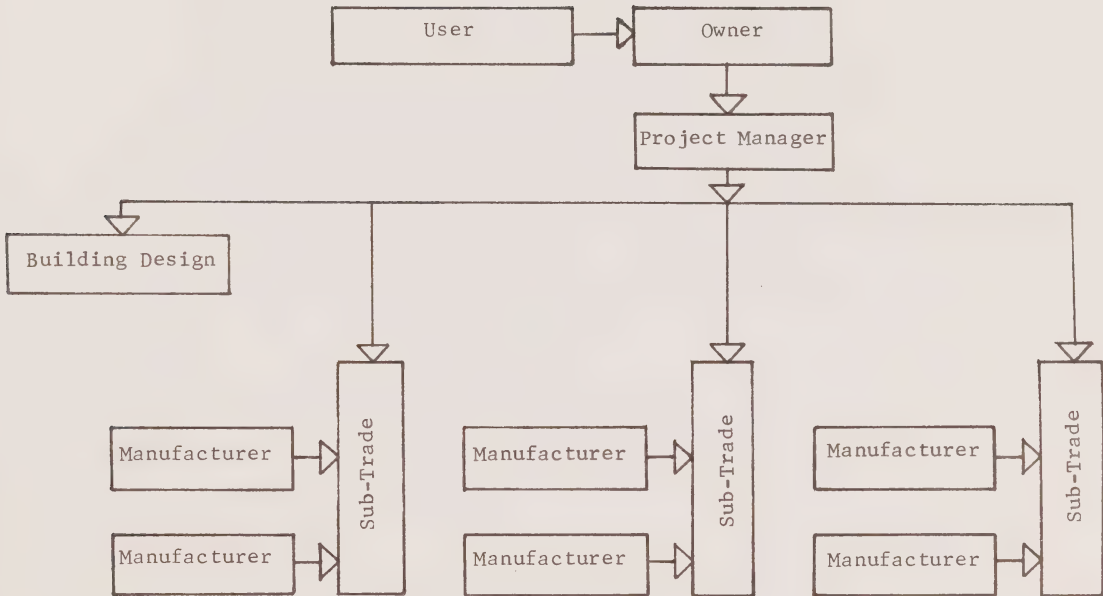
11. The Globe and Mail, page B3, September 21, 1973.

EXHIBIT 14TWO ALTERNATIVE ORGANIZATIONAL
ARRANGEMENTS FOR ARCHITECTURAL FIRMS1. Direct Tender OrganizationArchitect has greatest autonomy

- Architectural firm is hired directly by the owner
- Architect helps select builder by tender
- Architects may administer the contract

2. Developer Proposal (Turnkey Contract,
Design Build)Architect has reduced responsibility

- Architect or architectural firm is an employee of the builder/developer (third party between the architect and owner)
- Architect may have difficulty in communicating directly with the user; although he is responsible for producing the functional program.
- Architect is not in a position to ensure that the builder provide the owner for maximum value for his money, during construction

EXHIBIT 14(a)THIRD ALTERNATIVE ORGANIZATIONAL ARRANGEMENT3. Project ManagementArchitects have most narrow role

- Architecture firm selected and employed by the Project Management firm (third party between architect and owner)
- Architect may only be required to work from schematic design prepared by project management firm
- Architect has no function beyond providing contract drawing (architectural involvement may not extend beyond sketch design stage).

between construction feasibility and design during the design process. As a result of these trends, there are two possible influences that may become more important in future large project activities. They are that:

- non-architectural firms with construction management capability may be taking over more important roles in construction, and that
- restrictions preventing architects from developing in-house construction capability may tend to make architectural firms less competitive against possible encroachment by construction management firms.¹²

In the next section, it is shown that more traditional engineering consulting firms may be losing in competition with engineering construction firms as a result of their not being sufficiently strong in large scale engineering construction management; there may be a parallel in the case of architectural firms. To the extent that this analogy holds true, in the future architectural firms may have less control of building projects.

The relationship of this possible adjustment in rôle of the architectural firm to the question of foreign ownership is as follows: If architectural firms have less control over building projects, other "para architectural" firms will have greater control.

For large projects in the future, an integrated team, which may hire an outside architectural firm but which in itself combines the

12. Architectural firms cannot undertake construction projects themselves although they can form companies for supplying services to them, including construction services. However, there seems to be strong tradition against this type of "conflict of interest" situation.

skills of project management, engineering design and construction, may become pre-eminent. Such organizations, as in the engineering consulting field, may also tend in some cases to be the larger international and foreign-controlled organizations.

While we have discussed the potential emergence of "para-architectural" firms adopting the "package deal" approach, the disadvantages of foreign-controlled "para-architectural" firms have not been assessed; the issue is raised as a potential development in the Canadian architectural profession. More concern is possibly warranted with respect to the loss of position of the architectural firm than to the emergence of foreign- as opposed to Canadian-controlled "para-architectural" firms. However, it is felt that both aspects of the question merit ongoing attention.

FOREIGN OWNERSHIP IN THE CONSTRUCTION INDUSTRY

The possibly shifting rôle of the architectural firm in future construction activity has been discussed above. The potential diminished rôle of the architectural firm relates to the broader question of what influences on architecture in Canada can be attributed to present foreign direct investment or foreign control of the users of architectural services (developers and corporations), and suppliers of materials (building materials and building systems industries).

In order to analyze this possible influence, the principal areas of potential influence examined were as follows:

- choice of architect
- type of architectural design.

Choice
of Architect

The fact that some developers are foreign-controlled has some influence over the choice of architect in Canada.¹³ One local developer firm, which is European-controlled, is alleged to have tried to design their projects with architects from the home country. This and other cases are not considered to be too successful, since the architectural environment in Canada is so different from that of the European countries (e.g. it is European practice to have the architect, engineer, and constructor as one unit). Another architectural firm noted that in some cases of take-over situations involving the user companies' becoming foreign-controlled, the architectural firm had to re-establish its relationship with the new client. While this would be the usual proceeding in a change of ownership situation, it does present the potential problem of the foreign owner bringing in his own architect.

Some types of developers (for instance in the large-scale shopping centre field) might attempt, in the future, to bring in their own architectural services. At the moment, however, the influence of the foreign-controlled developer in bringing in architectural services remains only a potential threat to Canadian architects.

13. The number of foreign-controlled developers in Canada is not recorded. However, the Toronto based Urban Development Institute recently estimated that about 25 to 40 of 150 member firms are foreign-controlled under the terms of the proposed Federal Foreign Investment Review Act.

As noted above, the major purchasers of foreign architects' services are Canadian-controlled companies or governments. Therefore, although the activities of foreign-controlled developers might be watched, the more important consideration remains the Canadian-controlled organizations' reaching out for the foreign architect.

Type of Design

There are many cultural and historical influences which serve to influence the type of design of the physical facilities in Canada, and no attempt to catalogue them has been made. For example, it is said that Canada has not yet developed a distinctive Canadian architectural style, and is in fact part European and part continental. This may be because many well designed buildings in Canada are the result of the practice of foreign-trained architects.

There is the possibility that foreign-owned corporations will exert a "foreign" influence on the design of their facilities, although the architect might be Canadian. Some foreign-controlled hotel and restaurant chains and other "franchise packages" provide detailed specifications to ensure that their visual image remains as it is everywhere else in the world. It also happens that the most favoured interior designers of hotels in Canada at this time seem to be an American controlled firm.

Aside from the rather visible and hence cultural impact of the foreign owner on the types of design in chain situations, other foreign-controlled corporations do not seem to be as intent on importing design

concepts. There are some exceptions to this but usually the client will try to fashion a Canadian image.

Foreign control of the building materials industry, which appears to be extensive in some areas, affects the type of design of projects. The architect may design the project around a certain building material product particularly favoured (for cost and other reasons) by the owner. Building materials decisions that may affect the dominant characteristics of the building or interior decoration may result from foreign design concepts.

Building Systems, whose designs are patented by foreign companies following extensive research in this area, present a particular type of foreign influence on housing design. The impact of the use of systems building (alternatively called 'factory-built housing') on residential housing has not been very strong in Canada thus far. The primary reason is that the techniques presently employed still demand very large markets within a short distance from the manufacturing plant. A number of Canadian-controlled developers purchased the rights to certain European designs, but most have abandoned efforts at present to make systems building a going concern. In the future, however, one can anticipate greater influence of systems building, whose basic designs have been foreign thus far. Again, it is not to be concluded that foreign is "bad" but that the foreign influence may grow.

SUMMARY

1. Based on the above analysis, it appears that Canadian architectural firms are not suffering unduly from the competition of foreign architectural firms, but that there continue to be some problems. Canadian-controlled client companies and governments have hired foreign architects, and this situation is deplored by the Canadian architectural community, particularly for prestige buildings.
2. Besides the deleterious effect on Canadian architectural firms, there has been broader impact on our culture. Canadian cities for the most part are North American cities in terms of major building design.
3. Architects do not seem to want increased restrictions on the use of foreign architects in Canada, but would like to have clients assess more carefully whether or not services could be obtained in Canada.
4. Larger architectural firms would like to lessen the restrictions by the provincial associations, both to increase their flexibility in local practice and to increase their opportunities to obtain commissions in other provinces and internationally.
5. The issue concerning whether or not architects are being squeezed by para architectural competitors is difficult to resolve, but the possibility is suggested; if this is so, architects in Canada may be affected by competition from large foreign-controlled project management/construction firms who tend to be more active in this field than their Canadian-owned counterparts.
6. Some attempt was made to assess whether other parts of the construction industry, which contain some foreign-controlled organizations, have influence over architecture in Canada. Some present and potential influence was noted in particular cases, but aside from some possible cultural implications, no conclusion was reached about the seriousness of this influence.

IV - COMPARISON BETWEEN FOREIGN- AND CANADIAN-CONTROLLED FIRMS

This section examines the differences and similarities in behaviour between foreign-controlled and Canadian-controlled architectural and engineering consulting firms. A description of the firms examined and the points of comparison is followed by a comparative analysis of major behavioural characteristics.

FIRMS AND POINTS OF COMPARISON

As discussed in Section I, five firms were selected for detailed examination, and senior officials of another ten were also interviewed.

The criteria for selecting the five firms for in-depth examination were based on a preliminary understanding of the architecture and engineering consulting industry. The following characteristics were sought in the sample selection:

- a mix of foreign- and Canadian-controlled firms
- firms with substantial operations in Canada
- firms with actual or potential significant export activity
- Canadian firms operating in areas where foreign competition is evident
- Ontario as head office or province of significant activity
- inclusion of one major architectural firm.

EXHIBIT 15

COMPARATIVE DATA FOR SAMPLE FIRMS

	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5
A or E	Engineering	Engineering	Engineering	Engineering	Architectural
Billings 1972 (\$ millions)	10 to 15	10 to 15	5 to 8	3 to 6	3 to 6
Exports	0 to 7%	25 to 35%	10 to 25%	15 to 25%	5 to 15%
Canadian-controlled (C) or Foreign-controlled (F)	F	C	F	C	C
Offices in other provinces	Yes	Yes	No	Yes	Yes
Specialties	Varied, with large project emphasis	Varied	Varied	Concentrated in one area	Varied, with some con- centration

The sample so selected ranged from medium to large size firms, and did not include the smaller architectural or engineering consulting firms. The major reason was that major projects are concentrated among the larger firms, and the problems of foreign competition are more evident in large-scale projects. Although there are pockets of foreign-controlled and foreign firms competing against the small engineering consulting firm, these are relatively much less important.

The sample includes two foreign-controlled and two Canadian-controlled engineering consulting firms, and one Canadian-controlled architectural firm. Exhibit 15, opposite provides further comparative data about the firms.

The data obtained from these five firms are used in a comparative sense wherever possible. The lone architectural firm makes comparisons in many cases not particularly suitable, but wherever it may typify large scale architectural firms the information obtained from the one firm is used in comparative situations. Additional interviews with a number of engineering consulting and architectural firms and industry-wide data also contribute to the comparative analysis.

Points of Comparison

Answers were obtained from the management questionnaire (see Appendix A, #1 to 10) regarding the firms' operations. These answers, along with a number of issues, have been distilled into the most relevant points of comparison of behaviour between foreign-controlled and Canadian-controlled A & E firms, as follows:

1. Possible correlations between foreign-controlled clients and foreign-controlled A & E Firms.
2. Scope of services offered, and size of projects handled.
3. Purchasing or specification of services policies with respect to Canadian content.
4. Exports of engineering services; how contracts are acquired, how aggressive the foreign promotion is, and how much reliance on Canadian Government and institutions there is.
5. Ownership of patents, licensed technology and processes, and other technical knowledge.
6. Management truncation; the extent to which the foreign-controlled firms are autonomous relative to their parent organizations.
7. Staff movement within Canada and foreign projects.

The analysis of the above issues should provide a composite picture of the larger A & E consulting firms, in terms of their behavioural characteristics. Some of the issues make reference to whether that behaviour is beneficial or not to Canada. For example, procurement decisions leading to the purchase of goods and services in Canada, the ability to perform foreign assignments, and relative freedom of control by Canadian employees are all allegedly characteristics beneficial to Canada. Conclusions about desirable behaviour are discussed in the final section of this report.

A & E CLIENTS

The sample firms were asked to give percentage earnings derived from Canadian-controlled versus foreign-controlled clients. A further

question was more specifically directed toward the foreign-controlled clients, and probed as to how much of their business came from clients who used their services elsewhere in the world.

An examination of the clients of the sample firms shows that between 20 and 35 per cent of the Canadian-controlled engineering consultants' domestic business is derived from foreign-controlled purchasers of their services. These figures contrast with the foreign-controlled engineering consultants who derive from 50 to 95 per cent of their business from foreign-controlled purchasers of services. The figures vary considerably from year to year, according to certain large-scale contracts with single clients that may distort figures for one year.

The intent of the questioning was to obtain an assessment of whether a foreign-controlled corporation would tend to use engineering consulting resources with which it was already familiar at head office. The second question, about the correlation of the parent corporation's also using the services of the parent engineering consulting firm in the home country, showed that there is some correlation. A substantial portion of the foreign-controlled engineering consulting revenues in Canada was from corporations already using the same firm at head office.

Oil Industry

Part of the explanation for the correlation of foreign-controlled consulting firms and foreign-controlled clients lies in the specific engineering skills being developed in the home country and imported into Canada, both by the foreign-controlled engineering consulting firm and

by the subsidiary corporation purchasing the services. This is particularly the case in the oil industry.

As described in Section II, oil refineries are largely designed by foreign-controlled engineering consulting firms, and the oil industry is almost all foreign-controlled. An oil company executive described how most engineering specifications for new refineries are first done by the company in the U.S. and then the engineering services are obtained. Thus, the process of hiring engineering services by foreign subsidiary oil companies often does not even begin in Canada.

Described to the study team was at least some attempt by major oil companies to increase project opportunities for Canadian-controlled engineering consulting firms. However, as demonstrated by the refinery construction figures in Section II, there has been no substantial change in the historical situation regarding the bulk of design and engineering undertaken outside Canada.

Through newspaper accounts of one of the Alberta Tar Sands projects it appears that attempts to wrest engineering work away from the major foreign-controlled firm responsible for the project are foundering due largely to the lack of alternative Canadian-controlled firm capability. There is little evidence that major oil companies in Canada are attempting to help create this capability.

Pulp and
Paper Industry

About half of the assets of pulp and paper companies are under foreign control in Canada. However, the engineering work for pulp and paper companies is largely undertaken by Canadian-controlled engineering consulting firms, who are hired by both foreign- and Canadian-controlled pulp and paper companies. Three Canadian-controlled engineering consulting firms who specialize in the pulp and paper industry appear to dominate the work in that industry.

From comments on the part of a senior executive in one of these firms, it appears that the relationship between the engineering consultants and the manufacturers is fairly close knit, and it is supposedly difficult for another engineering consultant to break into the industry. In fact, one large U.S. engineering firm tried, without success, to penetrate the pulp and paper engineering consulting field in Canada through the acquisition of a smaller Canadian-controlled firm.

It appears that Canadian-controlled engineering firms have grown with the pulp and paper business. Plant construction involves proven and well established engineering processes, and the client pulp and paper company has the required technical knowledge in Canada, whether it is a foreign- or Canadian-controlled company. The projects, though large, are not turnkey jobs and thus Canadian-controlled engineering firms do not yet have the foreign engineering constructor as a competitor.

Mining Industry

The mining industry is about half foreign-controlled in terms of total asset size. All but one of the three to four major engineering firms specializing in mining are Canadian-controlled.

It appears that by and large, mining companies use the expertise of Canadian engineering pools, whether in foreign- or Canadian-controlled companies. Historically, however, there have been cases of mining companies' bringing in a foreign based firm. The particular cases known in Ontario have been in the earlier stages of a foreign-controlled mining company's operations in Canada, at a time when it was not yet familiar with Canadian capabilities.

In mining engineering there are few new processes, but the ore bodies are different and, therefore, ore processing plants are different. Canadian capability has generally developed along with the exploitation of each new ore body.

Other Industries

Canadian competence also exists in hydro, thermal and nuclear power fields, although foreign-controlled firms have done a significant portion of the work in these areas. These power facilities are either government-owned or totally government-controlled.

Foreign-controlled manufacturing corporations appeared to make less use of foreign-controlled engineering consultants than some of their resource-based counterparts. These companies tend to use local firms for

constructing their manufacturing establishments, especially in projects which require primarily conventional engineering skills. Canadian firms fit the bill in these cases. There are cases, however, in which foreign-controlled engineering firms have secured contracts in Canada as a result of expansion of the facilities of the foreign-controlled corporations in Canada. This would occur in especially complex process facilities, which have often been previously designed in the home country.

One Canadian-controlled engineering consulting firm also complained that, following the take-over of Canadian-controlled clients by foreign-controlled corporations, the Canadian firm had subsequently lost their previous business. However, no statistical information could be obtained for such take-over cases.

Importing Services

Further insight into the relationships between the client and the purchase of foreign-controlled engineering services is supplied by two statistical import analyses. They are as follows:

- Special Survey Results - Business Service Payments by Country of Control, 1969 (Statistics Canada)
- a listing of the licences issued to foreign engineers by the APEO according to type of purchase.

The first source is the result of a special Statistics Canada survey which was intended to cover most of the total business service transactions for enterprises in Canada. The figures for two categories that could be construed as being most or in large part the purchase of

EXHIBIT 16

BUSINESS SERVICE PAYMENTS ABROAD
FROM ENTERPRISES BY COUNTRY OF CONTROL, 1969

	MILLIONS OF DOLLARS				
	Total	Canadian- Controlled Enterprises	U.S.-Controlled Enterprises	U.K.-Controlled Enterprises	Other
Consulting and Other Professional Services	98.0	15.5	70.4	4.2	7.9
Scientific Research and Product Development	57.7	3.1	49.5	0.8	4.3
TOTAL:	155.7 ¹	18.6 ²	119.9	5.0	12.2

NOTES: 1. The total of these two categories represents 13.5 per cent of the total business services and other transactions (i.e. total imports of services) by Canadian corporations in 1969.

2. The Canadian-controlled enterprises account for 11.9 per cent of the total for these two categories.

SOURCE: Statistics Canada, 67-001.

Kates, Peat, Marwick & Co.

engineering services are presented on the page opposite.¹⁴

Almost 60 per cent of manufacturing assets in Canada are foreign-controlled, although a greater proportion of the larger enterprises are foreign-controlled. However, the figures on Exhibit 16, opposite, show that foreign-controlled corporations account for about 88.1 per cent of the purchase of foreign business services in the two categories that are most relevant to engineering services; i.e. based on the available material there appears to be a correlation between the purchase of foreign engineering consulting services and foreign-controlled corporations.¹⁵

The second analysis was presented in the APEO Report, and the relevant table is reproduced on Exhibit 17, overleaf. The number of licences does not indicate value, nor does it account for a significant part of the total work imported, according to a conclusion by APEO.

The figures indicate that a substantial number of Canadian-controlled and government organizations hire foreign engineering firms who acquire licences for practicing temporarily in Canada. It also shows that since Statistics Canada figures indicate a foreign purchase/foreign-controlled correlation, possibly many foreign-controlled corporations do not acquire licences.

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14. The APEO Report also includes "management and administrative services", another category of which some, but probably not most, is A & E services.
 15. Additional data would be useful to indicate more clearly how much engineering consulting work is imported and the channels through which it is imported; i.e. how much engineering work is undertaken in the home country of the foreign-controlled firm which is paid through the Canadian office, as well as the amount of work purchased directly (which enters the business services statistics) by foreign- and Canadian-controlled companies.

EXHIBIT 17

ANALYSIS OF LICENCES ISSUED BY
APEO TO FOREIGN ENGINEERS 1971-1972

Nature of Engineering Service	Purchaser	NUMBER OF PROJECTS ¹	
		Canadian Purchaser	Foreign Purchaser
Consulting Engineer	Canadian Consulting Engineers	12	
	Canadian Architects	2	
	Developers	13	
	Government Agencies	16	
	U.S. Consulting Engineers		2
Plant, Product and Process Design	Canadian Manufacturers	19	
	U.S. Subsidiary Manufacturers and Parent Companies		22
Pressure Vessel Design	Ont. Dept. of Labour	11	
Building Services and Process Design	U.S. Design Builders		11
Building Services	U.S. Owners		2
	TOTAL NUMBER	73	37

NOTE: 1. The foregoing figures relate to 110 projects recorded by APEO.

SOURCE: "Canadian Engineering for Canadian Engineers", Table XII.

Reasons for Correlation

From the interviews of foreign- and Canadian-controlled firms, it appears that a reputation in the home country has an impact on the decision to hire an engineering consulting firm. One interviewee maintained that it was easier to convince a Board of Directors about the merits of a particular engineering consulting firm if the parent company had had a successful experience with that firm.

The APEO Report concluded that the motivation worked as follows:

- "(a) The purchasers are Canadian subsidiaries of foreign companies, for example the petroleum companies, and in much of industry the subsidiaries 'purchase' the parent companies' 'know-how', or rely on experts known to the parent companies. The motivations then are related to group economics, group control and group expertise.
- (b) The purchasers are subsidiaries of foreign companies that are accustomed to employing foreign consultants who know their processes and technical requirements and who are accustomed to their contract conditions, for example in refinery design and construction." ¹⁶

The foreign-controlled corporation, then, does not appear to show a bias against Canadian firms (at least in most cases); it is rather a case that they believe that equal Canadian competence does not exist. Given this lack of accepted Canadian capability, in a significant number of cases, the question is how Canadian firms can establish this credibility and expertise? A partial response is provided in the concluding section of this report.

16. "Canadian Engineering for Canadian Engineers", p. 4 and 5.

SCOPE OF SERVICE

Engineering Construction

One of the most important differences between Canadian- and foreign-controlled engineering consulting firms is in the scope of services offered and the size of project that can be handled. What readily became apparent during the interviews as the most relevant distinction was the so-called "engineering construction" service.

Engineering construction was characterized by consulting engineers as an American phenomenon, and represents a difference in approach between Canadian and American engineering consulting. In Canada, the traditional separation of the engineering consultant and the constructor (or contractor) is maintained, while in the American experience the two are commonly integrated into one firm. In projects calling for engineering construction expertise, the foreign-controlled firms have had a definite edge over the Canadian-controlled firms.

Engineering construction is described as a totally integrated approach to the design and manufacture of a given facility. The responsibility for design and construction is undertaken by a single organization, and this has apparently been a superior management approach in large, complex projects. In such large projects the client has greater assurance that cost and performance standards will be met, if the responsibility is located in a single organization.

Canadian Experience

The engineering associations in Canada have maintained the tradition that there should be a distinction between a consulting engineer and the contractor. In fact, there has been a tendency to exclude the major engineering constructor firms, which are primarily foreign-controlled, from association membership.

The consulting engineering profession in Canada has developed a tradition for the separation between consulting engineering and construction. The Canadian-controlled firms that are now moving toward the integrated-type contracts are doing so through association with independent entities to provide the construction capability. Foreign-controlled firms have both engineering consulting and the construction capabilities within one organization. It appears that unless Canadian-controlled engineering consultants adopt this method of organization for certain types of major projects, they will be considerably handicapped in future competition with foreign-controlled engineering consultants who also offer services as a contractor.

Project Size

Part of the reason that Canadian-controlled engineering consulting firms are sometimes at a disadvantage vis-a-vis foreign-controlled engineering consulting firms is due to their relative inability to take on really large projects. There appear to be several reasons for this. The first is a lack of engineering constructor capability (although as mentioned previously, some engineering consulting firms are acquiring

this capability) and its associated management techniques of cost control, and procurement services.

Another reason centres on a lack of financial capability to take responsibility for such large projects. The question of size depends on the field of expertise. For instance, Canadian-controlled firms can take on an \$80 million pulp and paper mill, but lack competence to take on a \$40 million refinery. This is partly explainable by the nature of the industry requirements and the background experience of the firm. Some industries require turnkey agreements, while others practice the more traditional approach to the hiring of a consulting engineer. Prior experience in pulp and paper mills, and an arrangement which does not require the engineering firm to undertake financial responsibility result in the Canadian-controlled firms' having an opportunity to go after the larger pulp and paper project.

The energy/gasoline crisis in the U.S. has resulted in an even greater consolidation of major engineering construction firms, who operate in Canada on the larger projects. The projects are becoming larger (e.g. over half a million man-hours are needed to build 150,000 barrel-per-day refineries) and the number of companies that can handle them is becoming smaller. Few, if any, Canadian-controlled or foreign-controlled subsidiaries in Canada are in the running in this particular field.

Specialization of Services

Canadian-controlled engineering consulting firms have grown largely through experience on Canadian projects. These projects have

been relatively small compared to those handled by the larger foreign-controlled engineering firms. The relatively few highly complex projects undertaken in Canada are subject to intense competition among these foreign-controlled firms. Therefore, Canadian-controlled firms have often not developed a pool of engineering talent capable of handling the more sophisticated and complex projects. The market may in fact exist in some cases, but the Canadian-controlled firm may reason that while there is enough repeat business in Canada to justify the development of a purely Canadian capability, the foreign-controlled consultants have a hold on that market.

The international engineering consultant, who has had more diversified experience in the larger home market (e.g. the U.S., the U.K. or Japan) has a more diversified base of expertise to draw upon. The "one-time-only" jobs in Canada generally go to the international firms with that kind of experience. Large pools of talent in a specific engineering field do not exist for every engineering project that is undertaken in Canada. Therefore, as it is asserted by the international firm, the foreign-controlled firm acts as a conduit and source for special engineering expertise.

The purchase of engineering consulting services from abroad, whether through a foreign-controlled engineering consulting firm stationed in Canada or directly from abroad, has enabled Canada to draw upon international engineering consulting expertise at the possible expense of inhibiting the development of indigenous firms. Whether

this expertise could be brought into Canada in a more effective way to develop Canadian capability is discussed in the concluding section.

PROCUREMENT AND SPECIFICATION OF CANADIAN EQUIPMENT

A question which is associated frequently with engineering consulting is the extent to which those in charge of the engineering determine where the equipment will be purchased. It is argued that a project designed by Canadian engineers will lead to purchasing of equipment in Canada, or at least tend to favour Canadian firms in procurement decisions. This argument particularly applies to Canadian engineers working on foreign projects.

Of the total construction budget, about 5 to 12 per cent is engineering cost. The procurement function may be included as part of the engineering function or accounted for separately, but is usually about one per cent of the total project costs. The equipment itself typically varies between 30 and 45 per cent of the project costs, while the construction contracts make up usually over half the total project costs. These order of magnitude figures show how the engineering-to-equipment ratio can vary. They indicate that equipment-to-engineering ratio can be from 2.5:1 to 9:1, while the more typical ratio is 5 to 1.

Canadian engineering consultants make the case that their involvement on foreign projects will lead to equipment purchases many times the magnitude of their engineering consulting services. It appears, from the Department of Industry, Trade and Commerce, that the actual equipment

orders for foreign projects are usually about twice the engineering cost, although the Department points out correctly that the potential is much greater.

Only in very few cases can up to 100 per cent of the equipment decision be stipulated for one set of manufacturers as opposed to another. Therefore, it by no means follows that when Canadian engineers design a project, Canadian manufacturers will fill the equipment requirements.

A Canadian engineering consulting firm designing a project in Canada or abroad would perhaps have greater familiarity with Canadian suppliers. To some extent the engineering specifications can be tailored to the home country's suppliers. From our interviews, however, the fact that Canadian engineers draw the equipment specifications was found to be relatively marginal in most situations with respect to whether the equipment is purchased from companies in Canada or not. This may in turn be the result of many standards and specifications being common to both the United States and Canada.

The engineering consulting and equipment procurement relationship is much tighter in situations where a relatively new process or technology is being designed. For example, when the AECL engineers design a nuclear reactor in another country, their design will utilize Canadian-type reactors. Usually this relationship prevails when the engineering design is primarily a function of the equipment manufacturer, rather than independent engineering consultants' designing a project whose equipment can be purchased from a variety of sources.

Foreign Projects

Most countries exert pressure in one way or another on equipment purchases originating in that country. In addition, the nationality of the client or financing source is also important. The most influential factor is financing and this often dictates not only where the equipment will be purchased but who will do the engineering.

While the behaviour of foreign-controlled and Canadian-controlled engineering consulting firms appeared similar in terms of purchasing in Canada for Canadian projects, there was a measure of difference in the international sphere. The larger foreign-controlled firms have established networks of procurement agents and services throughout the world. They rely on their services to select the best equipment for any given job. The Canadian engineering consulting firms do not have access to such an international procurement network, and therefore tend to rely more upon Canadian suppliers. While no concrete evidence could be gathered on the subject, it would appear that, all things being equal, more purchasing would be done in Canada when Canadian-based engineering consulting firms were used.

Domestic Projects

Both foreign- and Canadian-controlled engineering consulting firms contended that they try to purchase in Canada and this contention was backed by figures for specific projects. However, concrete examples were also presented of cases where, in equivalent projects, Canadian engineering consulting firms designing the project resulted in procurement in

Canada in contrast with the results of design by foreign-controlled consulting firms. In many of the latter cases it is said that equipment was not available in Canada within any realistic performance and cost parameters; while this is difficult to verify or refute without very detailed study, it is probably true for large, specialized components but not for the bulk of equipment required for most projects.

In the mining industry it was found that Canadian companies do not produce a great deal of the mining equipment purchased by mining companies. In the pulp and paper industry, however, Canadian capability is relatively strong. It is difficult to conclude that the engineering consulting firms themselves have much to do with the relatively weak Canadian mine machinery industry. The strength of the U.S. based engineering construction companies may have inhibited the development of Canadian capability in certain areas, but this was not explored further during the study.

A further difference between Canadian- and foreign-controlled consulting firms in the domestic area appears to be the emphasis placed on procurement services by the foreign-controlled firms. Procurement is viewed as a major service on the part of the foreign-controlled firms, one which requires extensive commercial, as well as technical, knowledge; it appears to be viewed more as a routine matter by the Canadian-controlled firms interviewed.

EXPORT OF ENGINEERING SERVICES

As pointed out in the statistics presented in an earlier section, the export of consulting engineering services from Canada now amounts to an estimated \$60 million per year. The main export services are: pulp and paper, mining and hydro power generation.

Each of the sample firms was asked about its exports. All firms in the sample have some foreign projects. The foreign projects accounted for between 5 and 35 per cent of the sample firms' work.

The foreign market can be divided between the U.S. and other foreign markets. The "other" category would cover the "Third World" countries as well as some industrialized nations. Canadian consulting firms generally do not work extensively in Common Market countries or Japan.

U.S. Market

The Canadian-controlled firms have developed exports in the United States although there have been difficulties. First, obtaining work permits for professional staff is difficult, especially at the draftsman level. Secondly, clients' attitudes toward the use of foreign consulting firms in the U.S. vary considerably; some have no particular bias against the use of foreign firms while others tend to freeze out foreign competition.

It was reported, although not substantiated, that U.S.-controlled consulting engineering subsidiaries in Canada do not necessarily find it

easy to obtain work in the United States. While the reverse is true - that foreign-controlled engineering consulting firms who do well in the U.S. often acquire contracts for subsidiary corporations in Canada - the route to work in the U.S. does not appear to be back through the parent organization.

Accreditation difficulties for engineering consultants vary among the various states. Sometimes, an association with local engineering firms is required. Canadian architects have far greater difficulty becoming accredited in the United States, and as described in Section II, often obtain accreditation in the U.K. and use this as a basis for working in the U.S.

Foreign-controlled engineering firms in Canada do not, as stated above, tend to work on projects in the United States. However, the Canadian firm appears to be used in "off-load" situations by the U.S. parent during periods of intense activity. For example, at present at least two U.S. subsidiary engineering firms in Canada have substantial teams in Canada designing for their U.S. head offices because the parent is currently too heavily loaded to do the work in the U.S. Though the decision to use the Canadian office for American projects is strictly in the interests of the parent organization in such cases, there are benefits in terms of extra work for Canadian engineers.

Other Markets

As discussed above, the awarding of engineering consulting contracts to Canadian firms depends on the financing of the projects.

If it is Canadian financing, Canadian engineering consultants' chances are much better.

When Canadian-based industrial firms (including foreign- and Canadian-controlled industrial firms) undertake major projects abroad, it does not appear that there is the subsequent automatic hiring of an engineering firm based in Canada to do the design work. In mining, for instance, some large projects are undertaken abroad by Canadian-controlled mining companies, who do not as a matter of course attempt to hire Canadian-controlled firms. There is no particular pressure, either economic or governmental, to ensure that Canadian-based engineering consulting firms are given maximum opportunity to undertake the foreign engineering consulting work.

The lack of national promotion on foreign projects would appear to be in contrast with that of other major Western countries. French, American, Japanese, Australian, British and other governments seem to ally themselves much more closely to the home based engineering firms in bargaining for direct foreign projects and in using foreign aid for this purpose.

Export Orientation Differences

The foreign-controlled firm often operates as part of an international firm with "pools" of talent and offices in several countries. The Canadian office of the international firm has historically been set up to staff Canadian projects only. Some of the more established

ones have developed a pool of engineers in Canada which in some cases have expertise that could be marketed directly from Canada. However, even in the cases of the more established firms, the export of services from the Canadian office remains primarily one of handling assignments during peak loading times in the head office.

Foreign-controlled firms in Canada maintain that from Canada they export where there is a "Canadian angle". This usually means Canadian financing, Canadian-controlled companies doing projects abroad, or other cases where the Canadian base is an advantage, the key to obtaining a contract. In some cases, it was noted that the international strength of the foreign-controlled firm had been directly invoked as leverage for the acquisition of contracts in foreign countries. However, the Canadian office is largely on its own in terms of developing export business.

The Canadian-controlled firm appears to have some major problems in exporting services. In some cases, the Canadian firms appear to lack a background of aggressive business promotion in foreign countries. Exports are more the result of trade commissioner service contacts and filling out applications for international funding agencies. In other cases, however, Canadian firms appear to be more aggressive in promoting their exports.

Some Canadian-controlled firms are export-oriented, while others appear to have the attitude that export promotion is really too costly. The latter, if they can maintain a reasonable workload in Canada,

question why they should go abroad at all. While this posture may be perfectly suitable to the principals involved, the net effect is not very positive in terms of Canada's export potential.

Both Canadian- and foreign-controlled firms have experienced in the last couple of years the benefit of Federal and Ontario Provincial subsidies to export activities. These subsidiaries are in the form of partial payments for international business trips and preparation of proposals or qualifications. In each of the cases, they have not amounted to more than \$10,000 to \$15,000 per year.

OWNERSHIP OF KNOWLEDGE

One question asked of engineering consulting firms was whether they owned particular design patents which would give them a competitive edge. It appears that few engineering consulting firms owned patents as such.

Foreign-controlled firms, however, often have a significant advantage in holding proprietary rights to certain technologies, primarily in the process industries. Canadian-controlled firms claim it is difficult to obtain licences to use this technology, and in fact one claimed that no Canadian-controlled firm has penetrated this area. This firm also mentioned that attempts to associate with foreign-controlled firms with a particular technology licence met with failure. In spite of this there was no suggestion that there should be some form of compulsory issuing of licences in such cases.

Engineering consulting firms sometimes sign secrecy agreements when undertaking work for a particular client with a sophisticated technology. The experience with secrecy agreements seems to be more prevalent among foreign-controlled engineering consulting firms.

Foreign Expertise

An area of technical knowledge, which is not protected by patent but which is a distinct advantage for foreign-controlled engineering consulting firms, is the possible use of services of experts elsewhere in the organization. The skills of an engineering consulting firm can be moved quite readily, and experts can be brought into Canada to work on a particular problem as required.

This international base of expertise throughout the organization is often the strength of the foreign-controlled consulting firm in Canada competing against Canadian engineering consultants. It is not a question of ownership of knowledge, but rather that such knowledge or expertise is readily available in some other part of the international organization.

MANAGEMENT TRUNCATION

The extent to which foreign-controlled firms are truncated in terms of management or decision-making was investigated. Since management truncation depends on industry characteristics, the basic corporate structure of firms in the industry was taken into account.

Engineering consulting firms are usually incorporated, while architectural firms are prohibited from being incorporated and are usually partnerships. The ownership of the engineering consulting firm may be public or private, and in either case the employees may own a significant part of the firm. The foreign ownership of the foreign-controlled engineering consulting firm marks a clear-cut distinction between the owner and manager, while in largely employee-owned firms (i.e. many of the Canadian-controlled ones) the distinction is less clear.

The engineering consulting firm is a fairly structured organization, with a president, manager of business development, and various functional heads. In the case of the foreign-controlled corporation, the functional heads may report both to the head of the Canadian organization as well as to their functional heads in the parent organization. This was the formal arrangement for one of the two foreign-controlled firms investigated.

Engineering consulting firms seem to be run strongly from a central authority, with a few key board members. The foreign-controlled firms studied had a mixture of Canadian and foreign nationals on the Canadian Boards, although one had mainly Canadians.

The Canadian-based operating management in both foreign-controlled companies had day-to-day decision-making autonomy but referred major policy decisions to the Boards of Directors. These decisions included diversification and new business areas.

Of the two foreign-controlled firms, one seemed to have somewhat more autonomy vested in its Canadian management than the other. Both, however, had established Canadian management which had considerable influence over the operations of the firm. In one case, there appeared to be more foreign nationals from the parent organization present in key positions for major projects, while the other operated more autonomously as a Canadian entity. Although both firms which were foreign-controlled had permanent Canadian staff, manpower and work allocation to the Canadian company depended on international work levels of the parent organization in an overall sense. However, both firms had a stated and demonstrated policy of maintaining a stable Canadian organization.

In terms of internal services (other than engineering specialties), the Canadian organizations of the foreign-controlled firms appeared to have their own, although in one case the support services were in turn supported by the parent organization.

With respect to potential Canadian ownership, the two foreign-controlled organizations had considered the possibility, but had not made any formal moves in this direction. Other foreign-controlled firms, as described with regard to Toronto firms in a previous section, have taken steps to provide Canadian management with the opportunity of buying out the Canadian entity.

Other foreign-controlled firms with a presence less established in Canada, appear to have relatively little autonomy. Although none of

these firms were interviewed in depth, there seemed justification in the criticism of their being basically a sales office in Canada, which only added staff for large projects. There were exceptions noted - for example, a U.K.-controlled engineering consulting firm interviewed appeared to operate more autonomously in Canada, although it tended to rely heavily on its backup expertise in London for major projects.

Work Undertaken
Outside Canada

Our interviews with Canadian-controlled engineering consultants reflected concern about the practice of the foreign-controlled engineering firm, whether it has an established office in Canada or not, of securing a project in Canada but doing much of the design work outside Canada. This practice may make sense in overall work allocation for the company's point of view, but Canadians (and the APEO Report authors) argue that while specialized skills may be required to undertake major and sophisticated projects in Canada, there exists sufficient engineering talent to undertake at least the more elementary production work, and often the entire project, in this country.

Following a direct request by the Select Committee the two foreign-controlled firms in our sample were asked specifically to provide the study team with information on the value of engineering work shipped to Canada. Both firms argued that the answer should be accompanied by fairly extensive explanations behind the figures and were reluctant to give quantitative information (in addition, one firm in particular emphasized that precise figures would take considerable time to obtain).

One of the two firms stated that it imported a significant amount of engineering services only when undertaking projects involving a particular process technology. Such projects did not constitute the bulk of this firm's work. The other firm acknowledged there were important specialty areas in which their home office provides substantial engineering services to Canadian projects. This firm pointed out that Canadian project volume does not justify in business terms the development of Canadian capability in some areas. It was also suggested that such importation be considered in the light of export efforts made by that firm.

It should be noted that the case is not quite the same among architectural firms. Foreign architects must associate themselves with Canadian architects, who undertake the engineering and architectural drawings, while the foreign architectural firm provides architectural consulting services. Such consulting services often represent about half the architectural fee. Similarly, Canadian architectural firms exporting architectural services usually export primarily design consulting services rather than a full range of architectural services.

STAFF MOVEMENT

All firms in the sample indicated that international work was an attraction to the recruitment of staff. The Canadian-controlled firms' practice was to assign staff to international projects and then bring them back to Canada once the project was finished.

The foreign-controlled firm also did this, but good professional staff might also work for the head office or other inter-

national offices. One foreign-controlled firm was proud of its having trained Canadians on Canadian projects, who are now using their expertise elsewhere in the world. On a world scale there is truly an advantage in being able to shift manpower throughout the world according to where the projects requiring specific expertise are located.

The effect of such international transfer, however, may be to reduce the competence built up within a single organization in Canada. The necessary pools of talent are not developed in certain specialty areas in Canada, although individual engineers become qualified. The result is in part that Canadian-controlled organizations often lack the qualifications or the "critical mass" to undertake large, specialized projects both in Canada and elsewhere in the world. It would appear that a foreign-controlled firm with a policy to develop Canadian capability in specialty areas to be exported as part of the Canadian organization, would have a more beneficial effect to Canada than the counterpart foreign-controlled firm which does not develop or maintain such Canadian capability. One of the two foreign-controlled firms in particular offered an illustration of a speciality developed by the Canadian operation and now successfully marketed by it on foreign projects.

V - ATTITUDES TOWARD GOVERNMENT INTERVENTION

Each of the five selected architectural and engineering consulting firms was asked about its attitudes toward possible future government intervention in the industry. These attitudes were canvassed according to the management questionnaire previously referred to, in particular sections 11 to 13. In addition to discussions with firms, several independent submissions made to the APEO Committee were quite useful references.

AREAS OF GOVERNMENT INTERVENTION

The three areas of government intervention probed in the questionnaire were as follows:

- whether there should be government regulations or incentives designed to increase the use of Canadian-controlled A & E firms
- whether governments should use their direct and indirect power over purchasing policies by government agencies and industry to increase the Canadian content of engineering services
- whether the government should use subsidies or other kinds of support to stimulate specific engineering skills in Canada for domestic and export markets.

Besides opinions related to these three issues, there was another which attracted significant comment:

- the rising tide of provincialism in Canada as manifested by provincial associations and provincial governments.

These attitudes are discussed in turn in the following sub-sections.

RESTRICTIONS/INCENTIVES

Restrictive Measures

Various types of restrictions were raised in the management questionnaire as possible government measures, the most important of which was as follows:

- restriction on the use of foreign-controlled or foreign-based engineering consulting firms by Canadian-based companies.

Two other potential restrictive measures of lesser importance mentioned were:

- distinctly Canadian performance standards set by government (in order to tailor equipment purchasing to Canadian manufacturers)
- restrictions on foreign-trained engineers practicing in Ontario or Canada.

Favouring of Canadian Firms

Neither the Canadian-controlled nor foreign-controlled engineering consulting firms interviewed wished to see the use of government regulation to favour Canadian-controlled versus foreign-controlled firms. Both types of firms emphasized moves which would develop Canadian capability and competence by Canadian engineers, whether they were in foreign-controlled firms or not. Therefore, the emphasis was on how to get more done in Canada.

An expression of this feeling was the suggestion that through government encouragement, if necessary, new university programs or new techniques in established curricula be used to assist the strengthening of Canadian capability. The emphasis was on construction management.

However, this concern over where the engineering work is actually done - whether in Canada or abroad - is part of a more general problem of corporate behaviour of foreign-controlled firms. In a sub-mission to the APEO Committee, the head of one foreign-controlled engineering firm suggested that a set of criteria be drawn up to rate the performance of foreign-controlled firms. An abbreviated version of these criteria appears in Exhibit 18, on page 94.

Canadian firms' opinion in this regard focusses on whether the foreign-controlled firm has its "corporate management" in Canada; that is, on whether the firm, although possibly controlled by foreign shareholders, is a Canadian operating entity, rather than merely a branch of a large international organization.

In terms of government action, both the foreign-controlled and Canadian-controlled firms' opinion seemed to lie more in the direction of "moral suasion" rather than government regulation. It was felt that governments, both federal and provincial, could step into situations where companies were contemplating major projects, and strongly encourage that the project be so managed to either include or develop Canadian competence. As might be expected, the Canadian-controlled firms were rather more emphatic about this than the foreign-controlled firms.

EXHIBIT 18SUGGESTED CRITERIA FOR GOOD CORPORATE CITIZENSHIP
FOR FOREIGN-CONTROLLED ENGINEERING CONSULTING FIRMS

A subsidiary will have:

- a board of directors dominated and chaired by Canadians
- Canadian operating management
- self determination in business development and operating policies
- a policy of hiring Canadian employees and engaging Canadian expertise
- a policy for steady growth in accordance with long range planning
- a willingness to diversify in order to stabilize its operations
- development of its own Canadian expertise and ability to market it internationally
- full access to the proprietary know-how, resources and expertise of the international organization
- opportunity to contribute ideas and concepts to the international organization
- good standing policies with respect to personnel administration
- substantial staff retained through periods of low activity even to the extent of transferring work from the parent company.

Source: As adapted from J. J. H. Pley, Questions and Observations with respect to the Future of the Engineering Profession in Canada, submitted to the APEO Committee on "Canadian Engineering for Canadian Engineers".

In an interview with one of the major purchasers of foreign equipment and engineering services, the idea of moral suasion was supported. The engineering manager in a large corporation cannot justify to his Board of Directors the use of a Canadian-controlled engineering firm for a major project if that Canadian firm does not already possess the required capability. Therefore, government intervention at the point of decision to argue that the project should include Canadian firms would have an impact on the Board's decision and provide a stronger basis for the engineering manager's recommendation. The Alberta Government appears to have adopted moral suasion to encourage the use of, in this case, Albertan engineers.

The Committee listed several suggestions as to measures which might divert work to Canadian-controlled firms. Among them are as follows:

- "(a) Legislation requiring that Canadian engineers in Canada be in charge of all engineering work done for Canadian projects and Canadian engineers be employed on the work.
- (b) Legislation requiring that, when foreign engineers do work on Canadian projects because of their expert knowledge and experience, they report administratively to Canadian engineers.
- (c) Legislation imposing tariffs or taxes on engineering done by foreign engineers.
- (d) Licences be granted to foreign engineers only on verification that Canadians were unavailable or unable to do the work.¹⁷

17. "Canadian Engineering for Canadian Engineers", p. 6.

One foreign-controlled engineering consulting firm warned against the insistence of local firms being used on major projects. The client corporation might then view the additional cost and risk as reasons for not undertaking the project at all. A Canadian-controlled engineering firm suggested that the government might subsidize the "learning curve" of engineering consulting firms so that at least the purchasing corporation is not forced to subsidize the development of Canadian organizational and technical capability.

If government were to subsidize a private corporation to use a Canadian-controlled firm, there first would be a problem of identifying the "learning curve" costs. A delay in a large expensive project affects its cash flow and possibly its financial viability; the calculation of such delay costs, as well as the extra costs involved in gearing up the Canadian capability, would be difficult. The total costs could be considerable, and the selection of projects for subsidization would raise difficult political and regional considerations. However, if the projects were at least substantially selected on the basis of potential for further work in Canada and abroad, such government initiative might significantly strengthen and accelerate the development of Canadian capabilities important to the future of consulting engineering and technological development in Canada.

Other Restrictive Measures

There was no enthusiasm for the hypothetical government intervention of government specification of Canadian engineering standards.

It was felt that either there would be no impact or that some projects would be cancelled as a result of too rigidly defined standards. The notion that Canadian standards might lead to equipment purchasing in Canada was not felt to be valid.

Firms interviewed were also unanimous in stating their opposition to the potential regulation of the use of foreign-trained engineers. They believe such a move would have negative consequences for the practice of engineering in Canada, since so many engineers now working in Canada have been trained abroad and their contribution to the profession in Canada has been substantial.

The engineering professions do not impose stiff barriers to the practice of engineering in Ontario by immigrants or others who have gained training outside the country. On the other hand, architectural associations have a much more rigorous qualification procedure on a provincial basis. By and large, however, there is no move afoot at the association level either by architects or engineering consultants to limit foreign-trained talent from settling and working in Canada.

Incentive Measures

Domestic Projects

Besides the recommendation of one Canadian-controlled engineering consulting firm that the government should subsidize the learning curve cost for the development of additional capability, there were few concrete notions as to what incentives could be applied for Canadian

engineering. There were references to the use of the same kind of subsidies and incentives that apply for foreign projects. However, there were no well developed answers as to what kinds of government support programs would assist Canadian firms in breaking into complex projects domestically.

Foreign Projects

In terms of engineering exports, as noted in a previous section, some use is already made of foreign export subsidies. Comments on the programs were generally favourable, although firms did note that the proper promotion of export work is a very expensive process in spite of government subsidies. One firm said that the incentives probably increase the number of proposals made, while another figured that his firm would have submitted proposals anyway for projects for which subsidies were granted (this was a representative of a firm based outside of Ontario).

Other suggestions about government assistance to promote exports included more aggressive commercialization (i.e. using aid to promote exports) of external aid programs, more assistance in assuring that a Canadian firm be put on the bidding list for an international project, and winnowing out the competition among Canadian groups.

In most cases, engineering consulting firms praised the trade commissioners service of the Federal Government. In some cases, however, Canadian firms find themselves competing with other Canadian firms for foreign contracts. While one complained that the trade commissioners

give the same information to a number of competing firms, others suggested that government should help through negotiation to prevent Canadian bids cancelling each other out.

There was some criticism of the CIDA aid programs and the Department of External Affairs diplomacy for not promoting Canadian commercial interests enough. The Export Development Corporation, which was set up to support credit needs appears to be regarded as a useful financial mechanism. In all cases of the Canadian-controlled firms, however, the feeling was expressed that most other export-oriented countries have a much higher degree of government assistance. A number of cases were cited where foreign governments used "global" bargaining tactics and direct political intervention to bring sufficient pressure to win the contract for the home firm.

The idea of a trading company came up in some of the interviews, but no one could say whether it would work or not. One consulting firm official was not optimistic, however, since other countries' successful experience with trading companies is based on far greater co-operation in information sharing and joint ventures between the business community and government as well as among individual corporations and firms in the business community. It was felt that, although intra-business and business/government relationships were improving, the required co-operation was not yet in effect. As well, individual corporations in Canada are not prone to act in joint ventures; this is possibly a result of the domination of industry in Canada by foreign subsidiaries, who might find it difficult to arrange joint ventures with their international competitors.

Among architectural and engineering consulting firms, however, there appear to be some formalized moves towards the use of consortia for foreign and domestic projects. These consortia are in the formative stages in many cases, and competition among individual members is still the dominant feature of their existence. All but one of the firms in the sample had formally established links with other groups in the hopes of getting larger project work. The most successful group arrangement seemed to be a more informal one among several Montreal-based engineering consulting firms.¹⁸ However, it appears that these moves are basically industry-inspired rather than the result of any government program.

Financial
Assistance to Employees

The question was raised whether there should be some government assistance to employees to buy control of the Canadian operations, or to stave off a take-over attempt. Both foreign- and Canadian-controlled engineering consulting firms were against such financial assistance.

In the first case, any incentive to foreign-controlled engineering consulting firm employees to buy out their foreign shareholders would give Canadians working for foreign-controlled firms an unmerited financial bonus. It was felt by executives of foreign- and Canadian-controlled firms that the employees of foreign-controlled firms should resort to the regular financial market to buy out the foreign-controlled firm.

18. Among consortia mentioned were the following: CEC (Canadian Engineering Company), Consult, Canatom, Tecult, Mansfield Consulting Group, and CIPM (Canadian International Project Management).

In terms of assisting Canadian-owned firms about to be taken over, the point was made that foreign take-over legislation at the federal level should be made to cover these situations. It should be noted that in the initial phase of the proposed federal Foreign Investment Review Bill, the threshold level of government involvement - at \$250,000 in assets or \$3 million in sales - is too high for government involvement in all but the largest of engineering consulting firms contemplating selling out to foreign interests. However, since foreign-controlled firms in this industry do not generally establish themselves in Canada through take-overs, there is really less call for government action of this type in the engineering consulting industry.

GOVERNMENT PURCHASING POLICIES

Discussion about government purchasing policies and practice centred on the two issues of (a) governments purchasing the services of foreign-based engineering consulting firms, and (b) governments developing engineering capability in-house, thus inhibiting the buildup of export potential among Canadian-controlled firms.

Government Purchasing Of Foreign Services

Governments at all levels were severely criticized by Canadian-controlled engineering firms for purchasing decisions which led to the hiring of foreign-controlled engineering consulting firms. This practice, it was contended, seemed to apply to Federal, Provincial and

Municipal Governments as well as the public institutions over which they had some control, and for large and small engineering consulting projects.

Although Canadian-controlled engineering consulting firms viewed with dismay the continuing practices of governments at all levels with respect to purchasing abroad, they were reluctant to suggest stringent penalties for using foreign services. Some of them again suggested moral suasion as the answer, rather than a system of subsidies or incentives to the departments, agencies, or municipalities.

This picture should be modified to some extent by the admission by the Canadian-controlled consulting firms that they were able to obtain government contracts on the basis of being Canadian. However, this situation seemed to apply mainly in cases of Canadian-controlled firms' having the equivalent competence to the foreign-controlled firm. In cases where a foreign firm was alleged to have superior capability, this pro-Canadian tendency dissolved.

Foreign-controlled engineering consulting firms claimed a bias against them in some cases - for instance, in qualifying for certain foreign subsidy funding. It seemed that in many cases foreign-controlled firms considered that they were excluded from the work, and they therefore did not attempt to pursue certain potential opportunities.

There is a broader issue that touches both on government and Canadian-controlled corporations' purchasing practices. This broader issue is the apparent mystique in the use of foreign services and the

foreign expert. Canadian engineering consulting firms claim they often have or can easily develop strength in a given area, but the government agency or Canadian-controlled corporation seems to favour the foreigner over the native.

The Committee comments on this issue by citing among the motivations for foreign purchasing the following:

- "(c) The purchasers are Canadian and import engineering believing it has been developed to a high degree, and believing that Canadian engineering either is not available for the job or would require an excessive budget and excessive time.
- (d) The purchasers are ignorant of potential Canadian sources for the engineering or think 'experts' must come from abroad."¹⁸

In-House Capability

Canadian- and foreign-controlled engineering consulting firms are unanimous in their criticism of certain government agencies' doing most of their engineering work in-house. The hydro, nuclear, and thermal power generation public agencies were especially singled out for such comments, although public works and transportation agencies were also mentioned.

In general, it was felt that the maintenance of in-house capability has in the past severely inhibited Canadian engineering consulting

18. "Canadian Engineering for Canadian Engineers", p. 5.

firms from developing certain skills, especially large engineering construction capability. This has an impact both in terms of being able to undertake projects in Canada, and on acquiring the necessary experience for the international market. The power authorities, with the possible exception of nuclear power, have not been export-oriented or organized in such a way as to be able to bid for foreign projects. Therefore, it is maintained that Canada is losing an opportunity of selling skills developed in Canada.

Engineering consulting firms are also quick to point out their capability in working on a design on a project basis, and affirm that they could work more efficiently than government agencies in such projects. Due to the relative bias of the interviews in this question (i.e. the comments were largely from consultants, not government officials) no attempt was made to assess the relative efficiency of governments' in-house work. An evaluation would require a rather detailed analysis and, in some cases (e.g. Task Force Hydro recommendations), such an analysis is forthcoming. However, it does not detract from the principal issue that engineering consulting firms feel in-house government services have inhibited their development to do projects in Canada and abroad.

SPECIFIC ENGINEERING CAPABILITY

Canadian- and foreign-controlled engineering consulting firms were asked about the possibility of governments sponsoring and develop-

ing specific engineering capabilities in Canada that otherwise might be imported. They were asked about:

- how best to select priority areas and ideas as to what these priority areas are
- the kinds of incentives needed to encourage the development of these priority areas
- the specialties particularly relevant to export markets and where these markets are.

There were few useful suggestions concerning how priority areas should be selected, although there were some specific comments on what the areas should be. The energy-related engineering construction areas were strongly suggested by one firm, while another encouraged government to build on our strength in natural resources and thoroughly learn how to exploit and process them. Some of the areas mentioned are listed on page 106.

It was felt that the way in which government could pinpoint specific areas for development would be through continuing dialogue with engineering consulting firms and industry. The Alberta controversy regarding use of local engineering expertise to develop the tar sands was mentioned as the type of situation around which such discussions could be initiated.

The APEO Report stressed the strong relationship between engineering consulting and industry; this might imply that the selection and development of special capabilities should be an industry/engineering

EXHIBIT 19ENGINEERING AREAS MENTIONED BY ENGINEERING
CONSULTING FIRMS IN WHICH CANADA SHOULD SPECIALIZEFIRM 1

1. University level training in project management for large engineering and construction projects.
2. Development of process engineering design (chemical) skills in Canadian engineering firms.
3. Emerging areas of engineering expertise:
 - (i) Gasification of coal and liquid hydrocarbons.
 - (ii) Processing of oil sands.
 - (iii) Processing of oil shale.
 - (iv) Nuclear power generation.
 - (v) Uranium enrichment.
 - (vi) Mass transportation systems.
 - (vii) Geothermal power generation.
 - (viii) In situ mining.
 - (ix) Environmental engineering.

FIRM 2

1. Thermal and nuclear energy generation.
2. Whole technology of exportation of natural resources (e.g. Arctic and offshore resources) including processing stage.
3. Other areas include urban mass transit and environmental engineering.

FIRM 3

1. Pipelines.
2. Refinery and chemical process design.
3. Thermal Power.

FIRM 4

1. "Any area in which there exist a potential opportunity for international sales that is suited to or can be adapted to Canadian talent".

consulting process. The foreign-controlled engineering firms tended to actively consider this on a pragmatic basis as part of their firm's marketing strategy - what can the Canadian office profitably specialize in and how can company x be sold on their engineering services.

Criteria for
Priority Selection

The question of the "thinness" of the Canadian market for large engineering projects is an important one when considering whether or how to develop Canadian capability. Since the market in Canada is relatively small, the number of large projects in each engineering field is rather small. However, the range of projects in terms of size and complexity probably varies as much as in most other countries.

All firms recognized that with so few large projects Canada cannot afford to develop capability for all types of engineering specialty. The country will have to continue to import some engineering and technological expertise.

An officer (Canadian) of one firm (foreign-controlled) reflected at some length on this issue. If some mechanism were established to ensure that a Canadian-controlled firm learns how to undertake a particular type of project during the course of a project in which foreign expertise is used, it is conceivable that subsequent projects could be undertaken by a Canadian-controlled organization. The one-shot or one-time project would not lend itself to this process, since the Canadian

capability might be created at considerable expense and subsequently never used again (unless there were a reasonable chance for export markets). In establishing whether an effort should be made to create a specific Canadian capability, he concluded that a necessary criterion would be that additional projects of that type would probably be carried out in Canada in the future.

Another issue arises in terms of providing at least competing capability in Canada. Future purchasers of services should not be put into a position of having to select from only one Canadian-controlled organization. Therefore, besides developing engineering capability in Canada, there would have to be some means whereby this capability is lodged in two or more organizations. However, some Canadian firm officials pointed out that projects are not cut and dried with respect to requirements. Firms grow and diversify in a variety of engineering skills, and there would probably always be some competition.

Another consideration is the time it takes for a firm to acquire sufficient expertise to undertake a specific project. A foreign-controlled firm official maintained that it might take two or three projects to learn how to do it, and suggested that the costs involved could be very high (he mentioned the Glace Bay Heavy Water plant as an example of costly engineering).

Canadian-controlled engineering firms pointed out that experience in one engineering specialty can be transferred to another engineering specialty.

Canadian firms, with a small base of projects, have had to develop greater flexibility than comparable firms in larger market areas. Therefore, the problem of developing competence was downgraded to some extent provided that a fair opportunity would be available to Canadian-controlled engineering firms to penetrate the market for large, specialized projects.

PROVINCIALISM

All five firms in the sample spoke of the increasing amount of provincialism in Canada, which was creating barriers to their undertaking work in certain provinces. Quebec and Alberta were usually singled out by the architectural and engineering firms as having somewhat higher barriers than other provinces.

To demonstrate the feeling of engineering consulting firms, the following two quotes are extracts from letters to the APEO "Canadian Engineering for Canadian Engineers" Committee, the first from a foreign-controlled engineering consulting firm and the second from a Canadian-controlled engineering consulting firm:

"There is one area that is seldom discussed in engineering publications or gatherings.....this is the apparent trend to an increasingly isolationist and protectionist stance within the borders of our own country mostly on a provincial basis. This trend is, I feel, detrimental to the interest of the engineering profession in Canada and consequently not in the public interest, which the profession is bound to uphold."

"The rapid growth over the last few years of a provincial attitude towards engineering work has become a major

concern to our company as a Canadian consulting engineering firm and to myself as a Canadian engineer. We have a serious enough situation in Canada with the volume of engineering on Canadian projects which goes outside the country without creating additional problems by having every province creating barriers which preclude the best utilization of the overall Canadian engineering talent."¹⁹

It is alleged that Provincial Governments in the "offending" provinces are primarily responsible for pressure on the part of the purchasers of engineering services (in some cases these are governments or government agencies) to use engineers and firms from that province to as great an extent as possible. Among architects, it appears that it is both the purchaser of the services as well as the provincial associations which make it difficult for out-of-province-based firms to work in that province.

The APEO Committee noted that instead of Canadian engineering for Canadian engineers the trend has been provincial engineering for provincial engineers. It made the argument for a Canadian approach as follows:

"Mature reflection, however, suggests that inter-provincial barriers to the flow of engineering could well inhibit the proper development of Canadian engineering capabilities. Many 'branches' of engineering are not large enough in any individual province to permit the development of real technological strength within that province. However, that strength can be developed nationally, if the total Canadian demand is considered. Failing this, Canadian expertise is not likely to develop, and non-Canadian companies already established in that kind of work would be called upon to do it."²⁰

19. Quotations are from individual submissions to the APEO Committee.
 20. "Canadian Engineering for Canadian Engineers", p. 5.

The APEO went on to recommend broadening the activities of its committee on a national basis.

Unlike some service sector industries, architects and engineering consultants are usually not national in practice. There are Quebec firms, Ontario firms, B.C. firms and so on. Although some larger firms have offices across the country, many of these offices are small and act primarily as local project and sales offices.

Architects and especially engineering consultants are fully mobile in terms of working on a particular project. The staff assigned to a project is made available at the client's head office and project site location as necessary. However, the basic engineering drawings and production work are usually carried out at the main location of the firm. Therefore, it is not unexpected that some provincial governments view absentee work, whether either in other parts of Canada or abroad, as being not in the best interests of their province.

The tone of the APEO Report and that of the engineering consultants interviewed reflected an "Ontario" or "Central Canada" orientation vis-a-vis the provincial issue. That is, with the possibility of participating in large projects in other provinces as Ontario-based firms, they favoured maintaining low provincial barriers to engineering work. At the same time, some of those who worked for Canadian-controlled firms supported raising barriers to foreign-controlled firms to undertake projects in Canada.

Rather than a lessening of provincialism and development of a national approach to engineering consulting, one might conclude that there will continue to be provincial pressure for greater distribution of the engineering benefits throughout the country. Some engineering consulting firms have formed consortia or partnerships with local firms to meet this pressure. In the near term future, one might predict a continuing trend in this regard.

VI - CONCLUSIONS AND POLICY CONSIDERATIONS

During the course of this study many individuals proposed ways to increase the strength and competence of architecture and engineering consulting in Canada. Some of the more promising areas which invite government consideration are discussed in this concluding section.

A & E PERSPECTIVE

At present, Canada has highly competent architectural and engineering consulting professions. As a developed and industrially advanced country, it might be expected that Canada should be enjoying a positive balance of trade with respect to architectural and engineering consulting services. Many exports of services are to Third World countries and are often part of Canada's aid programs. In fact, however, from all available evidence, Canada seems to import about twice as much architectural and engineering consulting services as we export and we have a particularly unfavourable trade balance vis-a-vis industrialized countries.

The reason most often advanced for the high import situation is that Canada does not have organizational and technical capability in all areas; furthermore, the small Canadian market for certain types of large, specialized projects restricts our ability to develop the required capability for all projects. This logic must be balanced by two further considerations: first, as reported by a number of those interviewed, Canadians are not appreciated in their own land, and there has been a

historical tendency by governments not to consider the positive benefits of fostering Canadian competence in given areas. The second reason is the basically continental outlook by the large subsidiaries of international corporations coupled with the high mobility of engineering teams, which lead to the importation of foreign, particularly American, engineering work.

The defensive reason for Canada's relatively low level of exports is that export promotion is very expensive and competition from the giant international firms is severe. Canadian-controlled engineering firms have not, in general, geared up to export their services. Foreign-controlled engineering consulting firms in Canada with some exceptions have not generally oriented their business development to the export market. In addition, it appears that the tradition of government support of exports in the engineering consulting area has not been as strong as that by other countries.

Foreign-Controlled Firms

The issue of foreign control of engineering consulting firms in Canada must be discussed within the import/export framework. Canada maintains a relatively "open" posture with respect to international engineering consulting firms and the free market thus works against the development of certain engineering skills in Canada. In a few important engineering areas, there may be about a half-dozen large international concerns which compete for projects in Canada.

The free market works against the development of Canadian engineering capability. The tradition, among most engineering firms working on remote projects, is to operate on a project basis and ship as much of the engineering design work as possible to head office. It is in the nature of engineering projects to operate on the basis of maximum utilization of one's own staff, preferably where they do not have to be relocated. Canadian firms do this when working on projects in other provinces, and unless otherwise compelled, foreign firms also operate in this way.

Basic Alternative

A basic choice for future government policy and Canadian professional orientation could be stated as follows: should Canada continue to allow the present market mechanism to work (e.g. to import engineering capability on the basis of "known" talent and experience) or should the country take steps to increase domestic engineering capability to provide opportunity for its citizens? Clearly, the Canadian-controlled engineering firms would benefit from the second alternative. It could be debated whether the country would benefit or not, although there would appear to be long-range benefits.

Based on the research and interviews, a strategy is put forward to achieve the second alternative.

It would seem possible to have access to foreign technology and expertise as required, but to control their input in Canadian projects. Canada will always have to draw up on some outside project

organizational expertise, but could bargain more aggressively with the large international firm. Canada cannot hope to have the latest technology in all fields, but it could, at least, be brought into Canada on Canadian terms. Some procedures for exerting this control are discussed below.

POLICY CONSIDERATIONS

The use of foreign engineering services by governments and corporations in Canada results in part from a perceived lack of organizational as well as technical expertise of Canadian-controlled engineering consulting firms. It appears, then, that both the foreign engineer and his organizational ability are hired.

Preceding chapters discussed how foreign-controlled firms seemed to have a substantial edge as engineering constructors. As a first step to make Canadian-controlled organizations more competitive, the following might be considered:

1. The engineering associations should seriously consider revising their professional stance on the question of engineering construction capability among Canadian engineering consulting firms. A change in attitude among Canadian professionals, as well as educational efforts (for example, the University of Windsor's new Construction Management Program), could lead to an increase in the organizational capability of Canadian-controlled firms.
2. Changes are also required to increase Canadian capability of underwriting the huge business risks that must be undertaken for large projects. The area of financial instruments, both by the firms themselves and by financial intermediaries requires examination. Government assistance might be appropriate as guarantors in large project situations.

A second step in equalizing opportunities for Canadian firms to be hired by large client corporations could be a change in the organizational philosophy of the hiring corporation. There are many alternatives to the present practice of hiring a single foreign-based or foreign-controlled firm to undertake the total engineering, construction and project management effort. The main policy that is suggested for consideration is the following:

1. Appropriate "moral suasion", by Cabinet level public representatives, of large corporations, especially foreign subsidiaries, at key points in the planning of large projects. Such moral suasion would be most useful in launching a process of seeking alternative organizational arrangements in order to maximize the use of Canadian capability. Government financing to split the learning curve costs with the corporation that is hiring the engineering consultants might also be considered.
 - 1.1 For moral suasion to work properly, the government must be very well informed. Canadian engineering associations should probably act as the intelligence network for government agencies, to alert them about prospective projects. If this informal technique does not work properly, then a more formal, compulsory review mechanism might be considered prior to all major engineering projects.
 - 1.2 To undertake moral suasion from strength, government must have its own technical competence to bargain effectively with large organizations in attempting to achieve more use of Canadian capability. Secondly, the competence must include knowledge of the many possible organizational arrangements that must be examined to enable large and small units of Canadian engineering to be amalgamated for large projects.

Governments in Canada can play other useful roles in stimulating the development of Canadian engineering competence and organizational ability. Several possible steps are as follows:

1. Government could take a more aggressive stance to support Canadian capability on international projects. This does not necessarily mean a higher financial contribution, although this should be examined. It could include using more political leverage and external aid to help Canadian firms, and perhaps to resolve certain potentially competing Canadian bids.
2. Government could increase the purchasing of Canadian engineering services to support Canadian capability, and subject themselves to the same review process (assisted, again, by professional associations) that private companies might be subjected to prior to using foreign engineering services.

There are examples, including several cases of government purchases, of the many positive benefits of fostering Canadian capability including the growth of skilled engineering employment in Canada and the "fallout" stimulus to technological innovation in this country and our ability to export engineering services.²¹

3. The government should examine at the same time the impact of government in-house work on the ability of engineering consulting firms to export their services. Consideration of the benefits to Canada of having strong commercial organizations competing in export markets should be included in any examination of government "make-or-buy" policies, i.e. whether engineering should be done in-house or by contract to engineering consultants.

A question which arises in considering these policy steps is whether we have the human resources to undertake projects in areas where we do not have as much experience as do foreign firms. To some extent, the required skills can be developed through adjusting higher education programs, but better organization and utilization of the engineering

21. The APEO Committee Report recommends: "That the Association of Professional Engineers of Ontario lend its sincere support to the development and application of governmental purchasing policies which include socio-economic evaluations or criteria, and which thus recognize total benefits to the society and to the country as a whole in decisions affecting importation of either goods or services.", p. 8.

talent we now have is essential to implement these policy steps. Large project opportunities will assist in drawing together qualified individuals with similar experience elsewhere or from related fields. However, the key objective should be to keep the teams that develop from experience on large projects as "going concern" Canadian operations, rather than have them scatter to other organizations and countries, once the project is completed.

Appropriate
Government Level

The term "government" was used above in a generic sense without denoting whether the Federal or Provincial Government should be most involved in these potential areas of government intervention. Because architectural and engineering consulting services are national and international in terms of projects and manpower allocation, the Federal Government might be the most appropriate level for overall policies. However, the jurisdiction and concern are primarily provincial, and there are no indications that this may change in the short run.

Even in an area of obvious Federal concern - exports - some provinces (including Ontario) have begun to act with some good effect to promote export of engineering consulting services.²² It is not that

22. For example, in approved cases Ontario pays for half of the expenses incurred in preparing proposals for foreign projects, subsidies which are refundable if the firm is successful in obtaining a contract for the proposed work.

these efforts should necessarily be diminished, but they might, at least, be better co-ordinated among provincial and federal organizations. (An example was given of a recent Ontario mission to Indonesia which was preceded by a Federal one and immediately followed by one from another province, thus confusing the Indonesians.)

Provincial governments may play a role in terms of moral suasion over large corporations. For example, the Alberta Government has been grappling with this issue with respect to the tar sands development. However, efforts to bargain with individual corporations may lead corporations to play one province off against the other. The provinces might establish for themselves an inter-provincial mechanism to ensure that this does not happen with respect to engineering consultants.

The Province of Ontario could take the lead in developing a more national approach, as appears to be desired by architects and engineering consultants. Ontario could begin by examining how large corporations may be playing the provincialism game against other provinces.²³ A prime consideration in such an initiative is the concern for a more even regional distribution of engineering services that Ontario would have to display to assume a credible role. Perhaps there might be a better system of regional pools of talent (e.g. oil extraction and pro-

23. Alberta, for example, was trying to have Syncrude's engineering for for tar sands development primarily Albertan, but Syncrude's resistance was partly on the grounds that the engineering expertise does not exist in Alberta.

cessing in Alberta, mining in B.C., etc.), and at the very least concrete efforts to employ local engineering consultants.

Foreign Ownership
Versus Foreign Behaviour

A set of "good corporate citizen" criteria could be developed for foreign-controlled engineering firms operating in Canada. The essential criteria might be as follows:

- development of a permanent engineering staff and commitment to operations in Canada
- international manpower balancing that takes into account the need for Canada to retain indigenous engineering pools or teams relatively intact
- development of specifically Canadian office expertise for export from the Canadian office
- production work on major projects to be done in the Canadian office or subcontracted to Canadian firms where practical.

If the foreign-controlled firm "qualified" according to established good corporate citizen criteria, then it would also qualify to be treated as such by government. Therefore, the more the government plays a strong rôle in promoting Canadian-controlled engineering consulting firms and foreign-controlled ones that fulfill the criteria, the more leverage government will have to foster Canadian capability.

Policy decision-making and control over a foreign-controlled firm remains largely external to Canada as has been described in previous sections. Therefore, the government might consider including as one criterion that the firm progressively become Canadian-owned. It

is suggested that there is no universal answer to whether Canadian ownership would produce the desired build-up of Canadian engineering consulting capability. Each case would have to be judged on its own merits with the above criteria as the primary consideration.

Should Canadians be encouraged or coerced into progressively buying out their foreign owners, the changes in the Canadian office would be difficult to predict. Foreign-controlled firms whose Canadian employees have bought them out appear to have retained some of the advantages of the former connection with the foreign firm. They can still draw upon these foreign resources, although in some cases they may have to give up marketing rights to certain parts of the world. Criteria for good corporate behaviour would again be of assistance in drawing conclusions as to the benefit to Canada in these cases.

The effect of Canadian ownership might be to make a fundamental change in the operations of the foreign-owned engineering consulting firm. As a wholly-owned subsidiary, the foreign-controlled firm is treated as a branch of the sales force and as a resource centre for manpower allocation. Once majority ownership is given up, then the firm in effect will only be in association with the parent firm. Therefore, there would not be the same incentive at head office to bring key foreign personnel to bear upon Canadian engineering problems, nor would there be an incentive for the Canadian office to have the engineering work done outside the country. Canadian ownership, consequently, might lead to

the firm's being pulled out of the international orbit.

Theoretically, Canada could utilize individual foreign experts to complement home-grown technical and organizational capabilities. However, some projects will demand the organized capability of the truly large international firms. Canada, until it develops a substantially larger market for engineering services, will not likely be able to generate the 200- to 300-men pools of specialized talent in one firm necessary to carry out the large, specialized projects. However, steps, such as those outlined above, could help build towards a stronger Canadian-based and largely Canadian-controlled capability to carry out such projects.

APPENDIX A

ENGINEERING CONSULTANTS ' MANAGEMENT
QUESTIONNAIRE AND COVERING NOTE

ENGINEERING CONSULTANTS' MANAGEMENT
QUESTIONNAIRE AND COVERING NOTE

The attached Engineering Consultants' Questionnaire is to be used as part of the study of the behavioural differences between foreign- and Canadian-controlled, architectural and engineering consulting firms. The study is being conducted for the Ontario Select Committee on Economic and Cultural Nationalism by Kates, Peat, Marwick & Co. It is not intended for response in written form until KPM&Co. has discussed it with officials of the respondent firm.

The questionnaire is divided into objectives and then specific questions under each objective. There are three categories of questions. The first concerns factual material relating to the firm's operations, the second to the behaviour of the firm, and the third to opinions of the respondent regarding possible government actions.

ENGINEERING CONSULTANTS QUESTIONNAIREObjectives of QuestionnaireFACTUAL MATERIAL RELATING
TO FIRM'S OPERATIONS

1. To determine corporate and management structure of the firm.
2. To determine the consulting areas in which the firm is competing.
3. To determine the relative fees and size distribution of the firm and its competitors.
4. To determine the amount, type, and trends over time of consulting services exported out of Canada, out of Ontario.
5. To determine the significance of the ownership difference (foreign vs. Canadian) of client corporations.

BEHAVIOUR OF THE FIRM

6. To determine the extent to which the firm's engineering services influence purchasing of other services, equipment, and materials, domestic and foreign, by the client.
7. To determine the Canadian content of the engineering work managed by the firm and sub-contracted to other firms.
8. To determine international career expectations for professional staff.
9. To determine the extent to which the ownership of patents affects positively and negatively consulting opportunities.
10. To determine value of, and influence on your Canadian consulting of foreign-based affiliated consulting firms.

OPINIONS ON POSSIBLE
GOVERNMENT ACTION

11. To determine the response to government regulations or incentives designed to increase the use of Canadian-controlled engineering firms.
12. To determine the response to much stronger use of purchasing power policies by government agencies to increase Canadian content of engineering services.
13. To determine the response to increased use of subsidies and incentives to support development of specific engineering skills in Canada for domestic and export markets.

FACTUAL MATERIAL1. Corporate Structure

- (a) How long has your firm been in operation in Canada? What have been the major changes in corporate and organizational structure since that time?
- (b) If your head office is outside Canada, what information about your operations do you send to the parent office? What are the reporting relationships to this head office? What decisions have to be referred to it?
- (c) Do you have other offices in Canada? In which cities are they? What is their reporting relationship to the Canadian (and foreign) head office?

2. Specialization Areas

- (a) In what area(s) do you now specialize? Five years ago?
- (b) How has this pattern of specialization changed since the firm was started? Over the last five years?
- (c) When was the last time you attempted to develop a new specialty area within your firm? Was it successful?
- (d) When was the last time that you decided to de-emphasize a specialty within your firm? Why?

3. Size and Competition

- (a) What were your approximate billings last year? Five years ago?
- (b) Who are your major competitors now and what are their relative shares of the market in Ontario, Canada, and abroad, as opposed to your own market share?

- (c) Which of your major competitors are Canadian and which are foreign-controlled?

4. Export of Services

- (a) What percentage of your billings are for clients in Ontario, Canada, foreign? What were these percentages five and ten years ago?
- (b) Have you received in the last five years any Federal or Provincial grants with respect to the promotion or conduct of export business? How much were they and from which agencies?
- (c) In the last ten major foreign contracts you have bid on, what have been:
- the dollar volume and the sponsoring client for each
 - the ones in which you obtained a contract, and the profit on each of these
 - the reasons for being successful or unsuccessful for each (your expertise, international contacts, Canadian Government funding?)
 - the Canadian competitors for each
 - the use of Canadian professionals relative to your total staffing for each project
 - the dollar volume of work sub-contracted to (or from)
 - (a) Canadian and (b) foreign firms.

5. Client Ownership

- (a) What percent of your billings last year were to clients who are Canadian-controlled firms? Foreign-controlled firms? What were these percentages five years ago?
- (b) What percent of your billings last year were to foreign-controlled clients whose head offices also use your services? Has percentage changed significantly in the last few years?
- (c) Do your competitors have an advantage or disadvantage in dealing with foreign-controlled clients?

BEHAVIOUR OF THE FIRM6. Engineering Influencing Purchasing

- (a) What influence do you have on the purchasing decision of your clients for services, equipment, and materials? On what types of projects?
- (b) On what types of projects or specializations does the engineering design lead to a purchasing of services, equipment, and materials from the country from which the engineering services were procured?
- (c) What is the magnitude related to consulting fees of the subsequent purchasing decisions so influenced by the engineering work?
- (d) Do you try to have your international work lead to decisions for the purchase of equipment manufactured in Canada? If your head office is outside of Canada, is there a tendency for your client to purchase from the country in which the head office is located?

7. Sub-contracting in Canada

- (a) In what cases would you sub-contract engineering work to other firms in Canada?
- (b) Is your sub-contracting decision influenced by a client desire (especially if government) to have its work done locally? By Canadian firms?
- (c) If you are a Canadian firm, do you work as a sub-contractor for foreign-controlled firms? Do you employ foreign-controlled firms as sub-contractors?

8. Career Expectations

- (a) What is the usual career pattern, including time frame, of the persons with significant management or professional potential within your firm?
- (b) Do you have any foreign nationals in senior positions in your firm?
- (c) Do your professionals expect to work on projects abroad? Is this a feature of employment which you feel attracts good people to your firm?

- (d) Do you transfer senior professionals to other affiliates outside Canada?

9. Patent Ownership

- (a) Do you own any engineering patent which provides you with competitive advantages in securing contracts in Canada? Outside Canada?
- (b) To what extent do patents owned or controlled by other engineering firms present you with a competitive disadvantage?

10. Affiliations Outside Canada

- (a) Do you maintain regular contact with consulting firms outside Canada? What is your relationship to these firms? (a head office, subsidiary, formal association, prime or sub-contractor status?)
- (b) Do you have any formal or informal agreement that limits the scope of your consulting activities in Ontario? Canada? Internationally?
- (c) To what extent in obtaining contracts in Canada do you rely on foreign-based expertise that you can bring to bear on a project?

GOVERNMENT INTERVENTION

11. Restrictions on Foreign-Controlled Firms

- (a) What would be the impact on your firm if licensing, i.e. restricting practice to Ontario (Canadian) trained professionals, were introduced? What would be the impact on the industry as a whole?
- (b) How would the development of government performance standards specifically related to the Canadian environment affect your firm's operations?
- (c) How would subsidies or other form of incentives to Canadian firms affect your domestic/foreign operations? What types of programs would you suggest?

- (d) Should the government offer some form of financial assistance to employees wishing to buy out foreign ownership of the firm? Should financial incentives be provided for Canadian firms faced with a take-over situation?
- (e) Should government require that a significant portion of engineering services retained by individual corporations be from Canadian-controlled engineering firms?

12. Government Purchasing

- (a) Have you benefited or suffered from Federal, Provincial, or Municipal Governments favouring the use of Canadian engineering firms? Local engineering firms? Foreign-controlled engineering firms? What types of engineering services are these for?
- (b) What are the major areas in which government agencies and large industrial companies have developed an in-house engineering capability? Does this practice inhibit the development of innovative and export-oriented capability of engineering firms in Canada?
- (c) What would be your reaction to the Provincial Government imposing tough penalties on the use of foreign-controlled engineering services?
- (d) What would be your reaction to the government providing substantial incentives to its agencies or municipalities to hire Canadian engineering services?

13. Development of Specific Engineering Capability

- (a) Should the government seriously consider selecting and promoting the development of Canadian capability in specific engineering areas?
- (b) What is the best way of providing incentives to such specific engineering skill development?
- (c) What are the specific engineering areas which the government should begin to review if it were to promote specific engineering skills?
- (d) What are the emerging areas of engineering expertise that show highest potential for Canadian exports of engineering services? What are the most promising geographic markets?

